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Comparative Legal Frameworks for Payments for Ecosystem Services

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**COMPARATIVE LEGAL FRAMEWORKS FOR
PAYMENTS FOR ECOSYSTEM SERVICES**

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TABLE OF ABBREVIATIONS

AyA	Instituto Costarricense de Acueductos y Alcantarillados [Institute of Aqueducts and Sewers] (Costa Rica)
BMPs	Best Management Practices
CAs	Conservation Authorities (Ontario)
CAP	EU's Common Agricultural Policy
CARs	Corporaciones Autónomas Regionales [Autonomous Regional Corporations] (Colombia)
CBD	Convention on Biological Diversity
CFOR	Center for International Forestry Research
CICES	Common International Classification of Ecosystem Services
CREP	Conservation Reserve Enhancement Program (U.S.)
CWA	Clean Water Act (Ontario)
Defra	Department for Environment, Food and Rural Affairs (UK)
EPA	U.S. Environmental Protection Agency
ES	Ecosystem Services
EU	European Union
FAD	Filtration Avoidance Determination (U.S.)
FONAFIFO	Fondo Nacional de Financiamiento Forestal [National Forest Finance Fund] Costa Rica
GDP	Gross Domestic Product
GEF	The Global Environment Facility
GLPA	Great Lakes Protection Act (Ontario)
IIED	International Institute for Environment and Development
IUCN	International Union for the Conservation of Nature
IWRM	Integrated Water Resources Management
JMP	The WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene
MADS	Ministerio del Medio Ambiente y Desarrollo Sostenible [Ministry of Environment and Sustainable Development] (Colombia)
MAE	Ministerio Ambiental [Ministry of Environment] (Ecuador)
MEA	Millennium Ecosystem Assessment
MINAE	Ministerio Nacional de Ambiente y Energía [Ministry of Environment and Energy] Costa Rica
MINAM	Ministerio del Ambiente [Ministry of Environment] (Peru)
MOA	Memorandum of Agreement (New York)
MOECC	Ministry of Environment and Climate Change (Ontario)
MRSE	Mecanismos de Retribución por Servicios Ecosistémicos [Compensation Mechanisms for Ecosystem Services]
NYC	New York City
NYC DEP	New York City Department of Environmental Protection
NYSDOH	New York State Department of Health
OECD	Organisation for Economic Co-operation and Development
PES	Payments for Ecosystem Services

PPSA	Programa de Pagos por Servicios Ambientales [Payment for Ecosystems Services Programme] (Costa Rica)
PND	Plan Nacional de Desarrollo [National Development Plan]
MDGs	United Nations Millennium Development Goals
NGO	Non-Governmental Organisation
Ofwat	Water Services Regulation Authority (England)
REDD+	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation
SDGs	United Nations Sustainable Development Goal
SDWA	Safe Drinking Water Act (U.S.)
SEEA	System of Economic Environmental Accounting
SENAGUA	Secretaria Nacional del Agua [National Water Secretariat] (Ecuador)
SENPLADES	Secretaria Nacional de Planificacion y Desarrollo [National Secretariat of Planning and Development] (Ecuador)
SINAC	Sistema Nacional de Áreas de Conservación [National System of Conservation Areas] (Costa Rica)
SWTR	Surface Water Treatment Rule (U.S.)
TEEB	The Economics of Ecosystems and Biodiversity
UK	United Kingdom
UNDP	United Nations Development Programme
U.S.	United States of America
WAP	New York Watershed Agricultural Partnership
WFD	EU Water Framework Directive

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SIGNED DECLARATION FOR SUBMISSION OF POSTGRADUATE THESIS

I, the candidate, hereby declare that this thesis is my own work and has not been submitted for any other higher degree. All references cited have been consulted unless otherwise stated and a list of references provided.

The law is stated as at 1 April 2018.

Signed:



Date: September 23, 2018
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SUMMARY

In recent decades, the concept of ecosystem services has deepened our appreciation of the myriad benefits provided by ecosystems, and the risks to human societies posed by ecosystem degradation. There is a growing realisation that problems traditionally considered to be outside the environmental policy arena are in truth strongly connected to the environment: ecosystems underlie issues spanning climate, energy, food, water, urban planning, human health, economic development, social justice, and national security. Payments for ecosystem services (PES) create positive financial incentives for the protection and restoration of ecosystems, and represent one way to better represent the value of ecosystem services across a range of sectors. PES schemes are gaining traction in climate mitigation and biodiversity protection strategies, and most of all in the water sector. PES is complementing traditional approaches to water management and helping to address deteriorating water quality, declining water flows, and flooding.

This thesis takes a legal perspective, examining the role of legal frameworks in the design and administration of PES. It focuses on PES aimed at protecting freshwater ecosystem services, and considers how legal frameworks can incorporate PES into strategies for drinking water provision. It examines an emerging body of law relating directly to PES, and provides an opportunity to consider some of the leading examples of the ES concept being reflected in law. It distinguishes three broad categories of legal frameworks that establish, regulate or enable PES. A comparative methodology is applied to an analysis of case studies of legal frameworks for PES from: Costa Rica, Ecuador, Peru, Colombia, New York, England and Ontario. This analysis draws out conclusions about how the law relates to key policy issues around ES and PES, and different approaches to developing legal frameworks to guide PES, depending on different contexts and policy objectives.

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1.1 Introduction

In recent decades, the concept of “ecosystem services” (ES) has brought about a marked expansion of knowledge about the myriad ways ecosystems benefit human societies, and the risks posed by ecosystem degradation.¹ Healthy ecosystems provide “services” by sustaining natural resources such as fish and timber, generating fertile soils, mitigating impacts from flooding and storms, and maintaining the water cycle that underpins the provision of fresh water.² There is a growing realisation that challenges traditionally considered to be outside the environmental policy arena are in truth strongly connected to the environment: ecosystem functioning underlies issues spanning climate, energy, food, water, urban planning, human health, economic development, social justice, and national security.³ At the same time, pressures of population growth, urbanization, consumption and waste patterns, and anthropogenic climate change have led to drastically altered natural environments and continued declines in vital services provided by ecosystems.⁴ Policy approaches based on protecting and enhancing ecosystem services are highly

¹ E Gómez-Baggethun et al. ‘The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes’ (2010) 69 *Ecological Economics* 1209.

² Millennium Ecosystem Assessment (MEA), *Ecosystems and Human Well-being: Synthesis* (Island Press 2005).

³ M Potschin et al. ‘Ecosystem Services in the Twenty-First Century’ in M Potschin et al. (eds) *Routledge Handbook of Ecosystem Services* (Routledge 2016).

⁴ MEA supra (n 2).

relevant to confronting twenty-first century challenges to continue raising living standards for a growing population, within increasingly apparent ecosystem thresholds.⁵

Laws, policies and decision-making structures that impact ecosystems have not traditionally taken into account the long-term and wide-ranging value of intact ecosystems.⁶ Ecosystem service-based approaches are being increasingly adopted in local, national and international policy, as well as by non-governmental organisations and the private sector, with the aim to better incorporate the value of ecosystem services into decision-making, including economic decision-making.⁷ Payments for ecosystem services (PES) are mechanisms that provide direct positive incentives for the protection and restoration of ecosystems to secure the provision of ecosystem services, and represent one approach to better represent the value of ecosystem services in the economy.⁸ PES schemes are gaining traction in climate mitigation and biodiversity protection strategies, and most of all in the water sector, complementing traditional water management approaches and helping to address chronic problems such as declining water flows, deteriorating water quality and flooding.⁹ PES is being increasingly implemented to protect drinking water sources, and being integrated within frameworks for water service provision.¹⁰

This thesis will take a legal perspective, examining the role of legal frameworks for PES. It will focus on PES aimed at protecting freshwater ecosystem services, and consider how legal frameworks can incorporate PES into strategies for drinking water provision. This thesis examines the relatively novel and emerging body of law dealing directly with PES, and provides an opportunity to consider some of the leading examples of the ES concept being reflected in law. It contributes one of the first comparative legal studies of different approaches to designing laws respecting PES. This analysis will draw out conclusions about the role of law in the administration and design of PES, and how this relates to key policy issues around ES and PES. These conclusions

⁵ Potschin et al. supra (n 3).

⁶ TEEB, *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB* (Earthscan 2010).

⁷ *ibid.*

⁸ TEEB supra (n 6); S Wunder 'Revisiting the concept of payments for environmental services' (2015) 117 *Ecological Economics* 234; T Greiber (ed), *Payments for Ecosystem Services: Legal and Institutional Frameworks* (IUCN 2009).

⁹ J Salzman et al. 'The global status and trends of Payments for Ecosystem Services' (2018) 1 *Nature Sustainability* 136; G Bennett and F Ruef, *Alliances for Green Infrastructure State of Watershed Investment 2016*, (Forest Trends, 2016).

¹⁰ *ibid.*

will inform the development of guidance on options for designing law to enable and regulate PES towards different policy objectives.

1.2 Title and Research Question

1.1.1 Title

The title of this dissertation is: “*Comparative Legal Frameworks for Payments for Ecosystem Services.*”

1.2.2 Research Question

The core question this research seeks to address is: “*What is the role of legal frameworks in the design and administration of payments for ecosystem services?*”

1.3 Justification

1.3.1 Relevance of Ecosystem Services to Sustainable Development Challenges

The concept of ecosystem services emphasizes the ways in which human health, economies and culture depend on the natural environment.¹¹ One study of ecosystem services globally estimated their value at US\$124.8 trillion in 2011, compared to a global Gross Domestic Product of US\$75.2 trillion in the same year.¹² Replicating even a fraction of the services that are freely provided by well-functioning ecosystems would cost billions of dollars – if possible at all.¹³ Moreover, the intrinsic value of natural heritage and biodiversity is irreplaceable at any price. Despite this growing recognition, it is estimated that between US\$4.3 and US\$20.2 trillion per year worth of ecosystem services were lost between 1997 and 2011 due to land use change.¹⁴ Anthropocentric pressures are responsible for levels of biodiversity loss that are regarded as the sixth mass extinction in the earth’s history.¹⁵ Freshwater resources including rivers, lakes and wetlands are being degraded faster than any other type of ecosystem.¹⁶ Water security is a critical and increasing concern on every continent, relating to both the quality of water and its availability (including increases in extreme floods and droughts).¹⁷ The negative impacts of ecosystem

¹¹ TEEB supra (n 6).

¹² *ibid.*

¹³ *ibid.*

¹⁴ R Costanza et al. ‘Changes in the global value of ecosystem services’ (2014) 26 *Global Environmental Change* 152.

¹⁵ G Ceballos, PR Ehrlich and R Rodolfo ‘Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines’ (2017) *Proceedings of the National Academy of Sciences of the United States of America* 114.

¹⁶ *Global Biodiversity Outlook 3* (Secretariat of the Convention on Biological Diversity 2010).

¹⁷ D Russi et al. *The Economics of Ecosystems and Biodiversity for Water and Wetlands* (Ramsar Secretariat 2013);

degradation are experienced disproportionately by the poor and ecosystem changes are contributing to growing inequities and social conflict.¹⁸

Ecosystem service-based approaches are highly relevant to the sustainable development challenges facing society in the twenty-first century. For example, as demands for energy grow, energy production is generally water-intensive and will generate increasing stress on freshwater resources. Water used in the manufacturing industry is also expected to increase by 400 percent from 2000 to 2050, leading all other sectors. By 2050, agriculture will need to produce 60 percent more food globally, and 100 percent more in developing countries.¹⁹ This will increase demands for land and water, and the need for more efficient technologies and practices that maximize the range of ecosystem services that can be provided by agricultural land.²⁰ Continued urbanization will heighten the reliance of urban populations on ES generated by surrounding landscapes, and the expansion of water services to growing urban populations will amplify the need to protect water sources in upstream watersheds.²¹ Climate change is also increasingly impacting spatial distribution of water resources and the frequency and intensity of water-related disasters.²²

At the same time, there is potential for the protection of natural ecosystems to have a greater role in securing greater water, energy and food security. Current management practices remain fragmented and do not take advantage of potential synergies between ecosystem services.²³ While traditional environmental protection and biodiversity conservation strategies have been successful in mitigating some impacts on ecosystems, these are typically constrained within a sectoral approach, and are often resisted as an impediment to economic development.²⁴ ES presents opportunities to incorporate knowledge about ecosystem services across sectors towards innovative ecosystem protection strategies that extend beyond traditional silos and can

H Cooley, et al. 'Chapter 1: Global Water Governance in the Twenty-First Century' in PH Gleick et al. (eds) *The World's Water (v 8): The Biennial Report on Freshwater Resources* (Island Press 2014).

¹⁸ MEA, supra (n 2).

¹⁹ United Nations World Water Assessment Programme (WWAP), *The United Nations World Water Development Report 2015: Water for a Sustainable World* (UNESCO 2015).

²⁰ M Salman and A Martinez 'Chapter 5: Water for agriculture and energy: the African quest under the lenses of an ecosystem services-based approach' in J Martin-Ortega et al. (eds) *Water Ecosystem Services: A Global Perspective* (Cambridge University Press 2015).

²¹ Bennett and Ruef supra (n 9); United Nations Environment Programme and International Union for Conservation of Nature (UNEP and IUCN), *Green Infrastructure Guide for Water Management: Ecosystem-based management approaches for water-related infrastructure projects* (UNEP 2014).

²² WWAP supra (n 19).

²³ Bennett and Ruef supra (n 9).

²⁴ JB Ruhl, SE Kraft and CL Lant, *The law and policy of ecosystem services* (Island Press 2007).

demonstrate economic benefits.²⁵ There is also a compelling rationale for protecting and managing ecosystem services strategically, in a way that contributes to pressing sustainable development needs²⁶, and for bringing ecosystem protection squarely into sustainable development policy.²⁷

1.3.2 Relevance of Payments for Ecosystem Services to Water Management

Ecosystem protection is gaining increasing attention as part of the water security agenda.²⁸ The United Nations Sustainable Development Goal (SDG) 6 is to: “Ensure availability and sustainable management of water and sanitation for all,”²⁹ including the target to secure universal and equitable access to safe and affordable drinking water for everyone by 2030.³⁰ An estimated 844 million people still lack access to a basic drinking water service, and an estimated 2.1 billion people do not have safely managed water.³¹ While this remains a critical focus, the SDGs include broader targets that recognize the linkages between water service provision and ecosystems, moving further towards ecosystem-based management than the previous Millennium Development Goals. This includes the target: “By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.”³² This shift is regarded as:

*[...] a game-changer for water and sanitation, where countries need to move from a relatively narrow focus on providing access to improved sources of drinking water and basic sanitation, to a more comprehensive focus on sustainably managing the whole water cycle in an equitable manner.*³³

²⁵ TEEB supra (n 6).

²⁶ B Egoh, et al. ‘Integrating ecosystem services into conservation assessments: A review’ (2007) 63 *Ecological Economics* 714; C Wilkinson, et al. ‘Strategic spatial planning and the ecosystem services concept – an historical exploration’ (2013) 18(1) *Ecology and Society* 37; H Tallis et al. ‘An ecosystem services framework to support both practical conservation and economic development’ (2008) 105(28) *PNAS* 9457; C Perrings, et al. ‘Ecosystem Services for 2020’ (2010) 330 *Science* 323.

²⁷ TEEB ‘TEEB and the Sustainable Development Goals’ (*TEEB web*) <www.teebweb.org/sdgs/> accessed 14 April 2018; M McCartney, et al. ‘Sustainable Development and Ecosystem Services;’ in J van der Blik, P McCornick, and J Clarke (eds.) *On Target for People and Planet: Setting and Achieving Water-Related Sustainable Development Goals* (International Water Management Institute 2014); R Costanza, L Fioramonti and I Kubiszewski, ‘The UN Sustainable Development Goals and the Dynamics of Well-being’ (2016) 14(2) *Front Ecol Environ* 59; J Maes and S Jacobs ‘Nature-Based Solutions for Europe’s Sustainable Development’ (2017), 10 *Conservation Letters* 121.

²⁸ H Cooley supra (n 17); UN Water, *Advance Briefing: SDG 6 Synthesis Report on Water and Sanitation* (High-level Political Forum on Sustainable Development 2018).

²⁹ UN General Assembly, *Transforming our World: the 2030 Agenda for Sustainable Development* (A/RES/70/1, 21 October 2015).

³⁰ *ibid*, Target 6.1.

³¹ *Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines* (World Health Organization and United Nation’s Children’s Fund 2017).

³² UN General Assembly, supra (n 29), Target 6.6.

³³ UN Water, *Integrated Monitoring Guide for Sustainable Development Goal 6 on Water and Sanitation* (14 July 2017), 5.

A recent report by UN Water outlines trends that are emerging in the early stages of monitoring for SDG 6,³⁴ including the need to address increasing water pollution, develop solutions that are resilient to climate change, promote cross-sectoral cooperation, and an emphasis on the interdependence of goals. Payments for ecosystem services are pertinent in this context, as a way to promote the protection of ecosystem and secure ecosystem services that can help address water issues and integrate land and water management. UN Water also specifically refers to the need to further develop new financing mechanisms “with some being based on the recognition of the economic value of water and freshwater ecosystem”,³⁵ which points to the use of financial mechanisms like PES. Some argue that “[t]aking into account the value of natural ecosystems has the potential to transform current approaches to water management, and relates to wider efforts to transition towards a sustainable global economy.”³⁶

In the context of water service provision, specifically: “there is a growing realization among water service providers... that nature is not merely ‘nice to have.’ Healthy ecosystems are a critical asset in ensuring... access to clean, safe water”.³⁷ There is growing interest in ‘green infrastructure’, referring to the natural or semi-natural ecosystems that provide services for water resources management, with equivalent or similar benefits compared to conventional (built) ‘grey’ water infrastructure, often more cost-effectively. For example, protecting forested land, wetlands and improvements to agricultural land can naturally filter out pollutants, regulate river flows, recharge groundwater, and absorb flooding, often at a lower cost than building storm walls and treatment plants.³⁸ Such nature based solutions were the theme for the United Nations World Water Day 2018³⁹, and the subject of United Nations World Water Development Report 2018.⁴⁰

PES has become a prominent tool in securing green infrastructure, especially where critical ecosystems for water are located on private land. There has been tangible progress in this regard: payments to secure watershed ecosystems reached US \$25 billion in 2015, with a total of 419 PES schemes in 62 countries investing in ecosystems with the aim of protecting water supplies for cities

³⁴ UN Water supra (n 28).

³⁵ *ibid*, 3.

³⁶ D Russi et al. supra (n 17), 56.

³⁷ Bennett and Ruef supra (n 9), 1.

³⁸ D Russi et al. supra (n 17); UNEP and IUCN supra (n 29).

³⁹ ‘The answer is in nature’ (UN Water World Water Day 2018) <<http://worldwaterday.org>> accessed 8 May 2018.

⁴⁰ United Nations World Water Assessment Programme, *The United Nations World Water Development Report 2018: Nature-Based Solutions for Water* (UNESCO 2018).

and other communities.⁴¹ PES schemes are expected to progressively complement traditional regulatory measures, and legal frameworks for PES are increasingly relevant in the water management context.⁴²

1.3.3 Relevance of Legal Research on Payments for Ecosystem Services

PES has generated enormous academic interest: it was a relatively obscure term two decades ago, with only three PES journal references in 1995, growing to over 1,900 PES journal references in 2016.⁴³ The body of work on ES is much greater still, with interest spanning disciplines including ecology, economics, conservation, planning and environmental policy.⁴⁴ However, there has been relatively limited legal research on ES and PES. Some legal scholarship has considered how legislative frameworks and the common law might be advanced to better reflect ES,⁴⁵ how PES represents a shift in public and private rights and responsibilities respecting nature,⁴⁶ how courts have interpreted ES in matters such as environmental damages,⁴⁷ and how ES might inform the interpretation international water law.⁴⁸

The most significant body of legal research on PES has been led by the Katoomba group,⁴⁹ an international NGO that promotes PES approaches; this includes studies broadly considering the legal context in which PES is implemented in different countries, and forming guidance on how laws can support scaling-up of PES. The United Nations has also led substantial research to support assessments of developing countries' legal and institutional readiness for implementation of the UN Reducing Emissions from Deforestation and Forest Degradation Programme (REDD+).⁵⁰ Legal frameworks for PES have also been considered as an emerging area in relation to water

⁴¹ Bennett and Ruef supra (n 9).

⁴² Greiber supra (n 8).

⁴³ According to a systematic literature review reported in Salzman et al. supra (n 9).

⁴⁴ Potschin et al. supra (n 3).

⁴⁵ Ruhl, Kraft and Lant supra (n 24).

⁴⁶ C Reid and W Nsoh 'Whose ecosystem is it anyway? Private and public rights under new approaches to biodiversity conservation' (2014) 5(2) *Journal of Human Rights and the Environment*, 112.

⁴⁷ R Pasténa, M Olszynskic, M Hantke-Domas 'Does slow and steady win the race? Ecosystem services in Canadian and Chilean environmental law' (2018) 29(B) *Ecosystem Services* 240.

⁴⁸ A Rieu-Clarke and C Spray 'Ecosystem Services and International Water Law: Towards a More Effective Determination and Implementation of Equity?' (2013) 16(2) PER <<http://dx.doi.org/10.4314/pej.v16i2.3>>, accessed 21 April 2018.

⁴⁹ Greiber supra (n 8); S Hawkins, *Laying the Foundation: An Analytical Tool for Assessing Legal and Institutional Readiness for PES* (Forest Trends 2011).

⁵⁰ F Robles, *Legal analysis of cross-cutting issues for REDD+ implementation* (UN-REDD Programme 2013).

management in Latin America.⁵¹ Some case studies have also examined the legal frameworks surrounding national PES programmes.⁵²

The limited legal research in this area may be reflective of the relatively small body of law that deals directly with ES and PES, and the relatively recent emergence of laws that adopt this terminology explicitly. The ES concept has yet to substantially permeate laws for environmental protection, conservation, natural resource management and urban planning, despite the wide adoption of the ES concept in policy. In most cases, PES has been established not via law but through ad-hoc programs or projects, in the absence of an overarching PES-specific legal framework.⁵³ In this context, this thesis examines the relatively novel and emerging body of law dealing directly with PES, and provides an opportunity to consider some of the leading examples of the ES concept being reflected in law. It contributes one of the first comparative legal study considering different approaches to laws respecting PES. Furthermore, it is one of the first works to compare approaches to PES across developing and developed country contexts. It also represents some of the first commentary on PES-specific laws that have been introduced within the past three years.

Compared to advances in science and economic methodologies for PES, there is relatively sparse legal guidance related to PES. As will be examined in this thesis, the law can have an important role in the design and administration of PES arrangements. Creating a legal and policy environment conducive to PES and other market-based approaches has been identified as among water management priorities.⁵⁴ It has also been argued that scaling up positive results of existing PES schemes may require a specific policy and legal frameworks,⁵⁵ such as those examined in this

⁵¹ BA Willaarts et al. 'Legal Framework and Economic Incentives for Managing Ecosystem Services' in BA Willaarts, A Garrido, and MR Llamas (eds.) *Water for Food and Wellbeing in Latin America and the Caribbean: Social and Environmental Implications for a Globalized Economy* (Routledge 2014) 365.

⁵² G Scheufelea, H Smith and X Tsechalicha, *The Legal Foundations of Payments for Environmental Services in Lao PDR*, (Australian Centre for International Agricultural Research 2015); G Alarcon et al. 'The Challenges of Implementing a Legal Framework for Payment for Ecosystem Services in Catarina, Brazil' (2016) 14(2) *Natureza & Conservação Brazilian Journal of Nature Conservation* 35; VK Kolinjivadi and T Sunderland 'A Review of Two Payment Schemes for Watershed Services from China and Vietnam: the Interface of Government Control and PES Theory' (2012) 17(4) *Ecology and Society* 10; K Bennett and N Henninger, *Payments for Ecosystem Services in Costa Rica and Forest Law No. 7575: Key Lessons for Legislators* (World Resources Institute 2009).

⁵³ Greiber supra (n 8); Willaarts supra (n 51).

⁵⁴ UN Water, *Water Security & the Global Water Agenda* (United Nations University 2013).

⁵⁵ Greiber, supra (n 8).

thesis. Furthermore, many authors have pointed to the need for stronger governance of PES,⁵⁶ and legal frameworks can make important contributions in this regard. Some have argued that in the absence of appropriate legal and institutional frameworks, PES may even amplify environmental pressures.⁵⁷ In this context, this thesis contributes guidance on possible options for developing laws dealing with PES.

1.4 Methodology, Scope and Structure

1.4.1 Methodology

This thesis applies a legal methodology, including both a doctrinal analysis of legal text as set out in legislation, and also a critical legal analysis of the law in context, considering the relationship between the legislation and policy goals. It examines the ways in which law has developed in response to normative objectives, looking beyond the legal text to consider the intended impacts and drivers behind the legislation. Specifically, this analysis will evaluate the underlying theory and policy objectives related to PES, and focus on how legal frameworks for PES address these issues. This requires interdisciplinary research that examines contributions from the fields of environmental policy, water resources management, sustainable development, ecology and economics, while the focus remains on legal research.

The analysis includes a broad review of policy issues related to ecosystem services and payments for ecosystem services, based on academic peer-reviewed publications, as well as grey literature and online materials produced by government and non-governmental organizations. It will then examine case studies of legal frameworks for PES, which will rely mainly on primary legal text, and also refer to related government publications and policy guidance, and commentary by academics and non-governmental organizations where available and appropriate. There is no attempt at empirical research to measure the effectiveness of law, or the impact of the law 'on the ground'. This research does not include surveys of PES practitioners and stakeholders, or other

⁵⁶ C Reid 'Between Priceless and Worthless: Challenges in Using Market Mechanisms for Conserving Biodiversity' (2013) 2(2) *Transnational Environmental Law* 217; G Van Hecken and J Bastiaensen 'Payments for Ecosystem Services in Nicaragua: Do Market-Based Approaches Work?' (2010) 41 (3) *Dev. Change* 421; R Brouwer 'Payments for Ecosystem Services' in M Potschin et al. (eds) *Routledge Handbook of Ecosystem Services* (Routledge 2016); V Kolinjivadi, J Adamowski and N Kosoy 'Recasting Payments for Ecosystem Services (PES) in Water Resource Management: A Novel Institutional Approach' (2014) 10 *Ecosystem Services* 144; E Gómez-Baggethun and R Muradian 'In Markets We Trust? Setting the Boundaries of Market-Based Instruments in Ecosystem Service Governance (2015) 117 *Ecological Economics* 217; KMA Chan, et al. 'Payments for Ecosystem Services: Rife With Problems and Potential—for Transformation Towards Sustainability' (2017) 140 *Ecological Economics* 110.

⁵⁷ *OECD Environmental Outlook to 2030: Executive Summary* (OECD, 2008).

elements of empirical analysis. Existing empirical research is considered relevant to the contextual analysis of the law as described above.

A comparative methodology is applied to the analysis of the case studies. Each of the case studies examines how the law applies to the design and governance of payments for ecosystem services and draws out conclusions about how the law relates to key policy issues around ES and PES. This analysis is organized according to a common structure for systematic comparison. This serves to illuminate the role of legal frameworks in the design and administration of PES. The comparison is then used to develop conclusions about the options for designing laws relating to payments for ecosystem services, according to different contexts and policy goals. This structure for this analysis is elaborated in section 1.4.3, below.

The case studies from Costa Rica, Ecuador, Peru and Colombia rely on legal texts, government publications and other sources in Spanish for which there are no official English translations. The author is fluent in Spanish and English and the texts were read by the author in Spanish and interpreted and translated into English. Text translated by the author is treated as a paraphrase, and is not contained in quotations marks. Where passages of text are translated very closely, rather than summarised, the footnotes indicate that the text is a direct translation by the author and a pinpoint citation is given. Official names of statutes or government bodies are provided in Spanish and also translated into English.

1.4.2 Scope

This thesis is scoped according to three main parameters: i) the legal perspective and focus on law relating to PES; ii) the focus on PES for ecosystem services related to water and water service provision; and iii) the selection of the specific case studies.

The focus on law results primarily from the author's background and expertise in the field of law, as well as the identification of a research gap in this area as discussed above. While the thesis incorporates interdisciplinary research in places, this research is considered from a legal perspective. The scope of the thesis does not include, for example, a detailed consideration of or contribution to economic theory, political science, or ecology relating to PES.

The focus on water is partly related to the author's expertise and interest in water issues, as well as the importance of water as a priority for sustainable development. It also relates to the relative prominence of PES schemes for water relative to other types of PES. Furthermore, ES related to water provides one of the clearest examples of human dependence on the natural

environment, given human's existential need for water, and due to the relatively well understood links between watershed ecosystems and freshwater provision. From a legal perspective, PES schemes related to the protection of drinking water provide an interesting opportunity to consider how legal frameworks can enable and regulate PES in the context of drinking water service provision, which is generally heavily regulated. The case studies each give specific attention to PES to protect hydrological services, including drinking water.

The selection of case studies is based on a number of criteria, including: the extent to which the legal framework explicitly addresses PES; the accessibility of information on the PES scheme, especially the availability of online access to primary legal texts; the availability of information in a language accessible to the author (English and Spanish); and notable or interesting aspects of the legal frameworks that provide opportunity for comparative analysis.

The case studies consider legal frameworks for PES in seven jurisdictions: Costa Rica, Ecuador, Peru, Colombia, New York City, England and Ontario. The Costa Rican example is notable as one of the best-established national PES programmes, it is supported by a substantial body of rules, and is one of earliest applications of ES in legislation. Ecuador has also developed a comprehensive set of rules to support its national PES programme, and is notable as the only jurisdiction in the world to address "ecosystem services" explicitly in its national constitution. Peru and Colombia have become leading jurisdictions in establishing laws to regulate PES schemes carried out by third parties, considered a "groundbreaking" development in law and for the status of PES.⁵⁸ New York City operates another of the most well-established and most cited examples of PES globally. It is often studied as an example of PES as negotiated between private parties, which neglects the important role of legal frameworks in shaping its design and implementation. England has some emerging examples of PES led by water service providers, with an enabling legal and policy context. Ontario is notable for its comprehensive legal framework addressing the protection of drinking water sources, and also recently introduced legislation to support community-based approaches to watershed conservation in the Great Lakes; these laws specifically enable PES at the local level, while such schemes have been slow to develop under these regimes in practice.

The case studies focus on the legal framework for PES rather than on the implementation of a specific PES scheme. The relationship between the legal frameworks for PES and what can be

⁵⁸ Bennett and Ruef, *supra* (n 9), ix.

considered one “PES scheme” varies in each of the case studies. In both Costa Rica and Ecuador, a national law is in place relating entirely to a national PES scheme. In Peru and Colombia, a national law is in place that applies to any number of decentralised PES schemes. In the United States, England and Ontario there are features of the respective national or provincial laws that enable PES in the context of local drinking water provision. The New York City scheme itself is considered more specifically because it is also supported by institutions and rules specific to that scheme, established mainly through voluntary agreements.

The scope of the legal frameworks analysed in the case studies is limited to law directly connected to enabling or regulating PES. Many laws have an impact on PES design, including laws for water management, forest management, agricultural land uses, protected areas, environmental impact assessments, and taxes.⁵⁹ An overview of the broader legal context in each jurisdiction is included in each case study, but this thesis does not attempt a treatise of the legal context for PES in each jurisdiction. Furthermore, within a particular jurisdiction there may exist several different examples of PES with different relevant laws. Private law relating to contracts and property rights, as well as laws relating to Indigenous rights, may also shape PES in important ways, but are not the focus of the case studies. The analysis primarily identifies where laws (generally, legislation) specifically address aspects of PES. It also identifies which aspects of PES are not addressed directly, and left up to determination in contracts, and subject to the application of general laws.

1.4.3 Analytical Structure

This thesis begins by providing a broad background exploring the concept of ecosystem services and payments for ecosystem services. This includes a review of critiques and policy issues related to implementation of approaches based on ES and PES. It then distinguishes three general categories of legal frameworks for PES, which were identified following a wide review of PES schemes and research on legal frameworks for PES. The categories are distinguished based on how the law relates to PES schemes, and the level of legal intervention in PES; the dominant role of the legal framework with respect to PES is identified as either ‘establishing’, ‘regulating’ or ‘enabling’, while recognising that there is overlap between the categories and that each of these features is present to some degree in each of the case studies. The specific case studies of legal frameworks elaborated under each category are as follows:

⁵⁹ Hawkins *supra* (n 49).

- I) ***Legal Frameworks establishing state-run payments for ecosystem services***, with examples from Costa Rica and Ecuador;
- II) ***Legal Frameworks regulating decentralised payments for ecosystem services***, with examples from Peru and Colombia;
- III) ***Legal Frameworks enabling payments for ecosystem services***, with examples from New York City, England, and Ontario.

Each of the seven case studies is organized according to a common structure for systematic comparison, describing how the law addresses different aspects of PES. Each of the case studies describes the following elements:

- i) ***An overview of the context and legal framework for PES***, including:
 - The environmental and economic development context;
 - The legal and institutional context; and
 - An overview of the legal and policy framework specific to PES.
- ii) ***How the law addresses PES actors and administration***, including:
 - Oversight of PES;
 - ES users and funding of PES; and
 - The eligibility of ES providers for payments.
- iii) ***How the law addresses PES design***, including:
 - The targeting of ecosystem services;
 - The structure of incentives and payment terms and conditions; and,
 - Monitoring and enforcement of PES agreements.

The case studies conclude with a consideration of how the legal frameworks for PES relate to key policy issues around ecosystem services and payments for ecosystem services, including:

- The role of government and institutions for PES;
- The application of ES theory and science;
- The rationale and theory underlying PES;
- The extent to which PES represents the commodification of ES; and
- How PES is integrated within broader legal and policy frameworks for the management of ecosystems.

1.5 Overview of Thesis

This thesis is organised into the following chapters and sections:

'Chapter 2: Ecosystem Service-Based Approaches' provides a foundation to situate this thesis within the broader ES policy context. Section 2.2 reviews the origins and development of the ES concept, and analyses how ES relates to broader principles of sustainable development, the Ecosystem Approach and Integrated Water Resources Management. Section 2.3 reviews the foundational framework that relates categories of ES to human wellbeing, elaborating on the link between ecosystems, water, and the protection of drinking water. Section 2.4 examines how ES-based approaches are being utilized in policy and decision-making. Section 2.5 provides a critical analysis of the contribution of ES to environmental policy, and section 2.6 provides a summary of conclusions and identifies key themes that will be explored in the case studies.

'Chapter 3: Payments for Ecosystem Services' examines payments for ecosystem services and the role of legal frameworks in their design and implementation. Section 3.2 reviews different perspectives on the underlying rationale and theory for PES approaches. Section 3.3 provides an overview and examples of PES in practice. Section 3.4 discusses key policy considerations for the administration and design of PES. Section 3.5 reviews legal frameworks for PES, and section 3.6 provides a summary of conclusions and identifies key themes that will be explored in the case studies.

'Chapter 4: Legal Frameworks Establishing State-run Payments for Ecosystem Services – Case Studies from Costa Rica and Ecuador' examines the category of 'establishing' legal frameworks for PES. Section 4.2 describes Costa Rica's *Payments for Environmental Services Program*, and section 4.3 describes Ecuador's *Socio Bosque Program*. Section 4.4 draws out conclusions on the role of 'establishing' legal frameworks in the administration and design of PES.

'Chapter 5: Legal Frameworks Regulating Payments for Ecosystem Services – Case Studies from Peru and Colombia' examines the category of 'regulating' legal frameworks for PES. Section 5.2 describes Peru's *Payments for Ecosystem Services Law*, and section 5.3 describes Colombia's regulation of PES to protect drinking water. Section 5.4 draws out conclusions on the role of 'regulating' legal frameworks in the administration and design of PES.

'Chapter 6: Legal Frameworks Enabling Payments for Ecosystem Services – Case studies from New York City, England and Ontario' examines the category of 'enabling' legal frameworks for PES. Section 6.2 describes the legal framework for New York City's Long Term Watershed

Protection Program in the Catskills watershed. Section 6.3 describes the legal framework for PES led by water service providers for catchment management in England. Section 6.4 describes the legal framework enabling PES for the protection of drinking water sources and for the conservation of ecosystems in the Great Lakes watershed, in Ontario, Canada. Section 6.5 draws out conclusions on the role of ‘enabling’ legal frameworks in the administration and design of PES.

‘Chapter 7: Conclusions’ synthesizes the findings of the previous chapters, and draws out general conclusions about the role of legal frameworks for PES. It provides guidance on different possible options for developing laws to address PES, based on different policy approaches and objectives.

CHAPTER 2

ECOSYSTEM SERVICES-BASED APPROACHES

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2.1 Introduction

Ecosystem services (ES) can be understood broadly as “the benefits people obtain from ecosystems”¹ or “the direct and indirect contributions of ecosystems to human well-being”.² While it is readily apparent that humans depend on their environment to sustain life and meet basic needs for water, food and oxygen, the concept of ES elaborates and makes explicit the myriad ways nature supports human life, societies and economies. Ecosystem services encompass, for example, the more familiar provisioning of water, food and fuel, as well as the underlying natural processes that support climate regulation, water purification, flood mitigation, and the pollination of crops, along with the aesthetic, spiritual and recreational benefits of nature that contribute to culture.³

Natural capital is a term often used in relation to ES, used to describe “the stock of natural assets that provide society with renewable and non-renewable resources and a flow of ecosystem

¹ Millennium Ecosystem Assessment (MEA), *Ecosystems and Human Well-being: Synthesis* (Island Press 2005), v.

² P Kumar (ed.), *TEEB-The Economics of Ecosystems and Biodiversity (TEEB): Ecological and Economic Foundations*, (Earthscan 2010), 19.

³ MEA, *supra* (n 1).

services.”⁴ Natural capital broadly encompasses all abiotic and biotic elements of ecosystems, as well as ecosystems themselves and biodiversity, resources such as water, soil, forests, species, air, and all physical, biological, and chemical processes.⁵ The term ‘capital’ adopts the neoclassical economics concept of stocks as having the capacity to produce further goods and services that benefit human societies.⁶ Natural capital is distinguished from other types of capital because it is freely available and can be self-regulating and self-renewing without human intervention. However, there is normally a mix of natural and human capital in harnessing benefits from ecosystem services.⁷ In this way natural capital is the starting point for the ES framework, with ecosystem services flowing from the underlying natural capital.⁸ Flows of ecosystem services can be viewed as the dividend that society receives from natural capital stocks, while overexploitation of ecosystems is likened to cashing out the account to the detriment of future returns.⁹

This framework for understanding the value of nature to human interests has been adopted widely in environmental and sustainable development policy, increasingly in the past two decades.¹⁰ In particular in the twenty-first century context, pressures of population growth, urbanization, and consumption and waste patterns have led to drastically altered natural environments, often to focus intensively on specific ‘provisioning’ services, such as food and energy production. While this transition has increased living standards for many, it has come at the expense of the broader range of services that intact natural ecosystems provide. Ecosystem service-based approaches attempt to broaden the lens beyond the apparent profits of ecosystem exploitation to consider the value of ecosystems in their natural state, and what is lost when they are converted to alternate uses, and how costs and benefits are distributed across society.¹¹ ES-

⁴ J Maes et al., *Mapping and Assessment of Ecosystems and their Services. An Analytical Framework for Ecosystem Assessments Under Action 5 of the EU Biodiversity Strategy to 2020* (European Commission 2013).

⁵ G Mace et al. ‘Towards a risk register for natural capital’ (2015) 27 *Journal of Applied Ecology* 641.

⁶ *ibid.*

⁷ FJF Maseyk ‘Managing Natural Capital Stocks for the Provision of Ecosystem Services’ (2017) 10(2) *Conservation Letters* 211; L Jones et al. ‘Stocks and flows of natural and human-derived capital in ecosystem services’ (2016) 52 *Land Use Policy* 151.

⁸ E Barbier ‘Natural capital’, in D Helm and C Hepburn (eds) *Nature in the Balance* (Oxford University Press 2013) 153.

⁹ Kumar *supra* (n 2).

¹⁰ E Gómez-Baggethun et al. ‘The history of ecosystem services in economic theory and practice: From early notions to markets and payment schemes’ (2010) 69 *Ecological Economics* 1209; JW Bull et al. ‘Strengths, Weaknesses, Opportunities and Threats: A SWOT Analysis of the Ecosystem Services Framework’ (2016) (17) *Ecosystem Services* 99.

¹¹ Kumar *supra* (n 2).

based approaches show promise in helping address some of the critical global challenges currently faced by humanity, such as water security, climate change, biodiversity loss, and meeting growing food and energy demands.¹²

There is no single formula for an 'ecosystem services approach', but rather a plurality of ecosystem services-based approaches that find applications across related sectors such as biodiversity conservation, natural resources management, integrated water resources management, agriculture, forestry, environmental impact assessment, urban planning, and natural disaster mitigation. Payments for Ecosystem Services represent one type of tool that might apply the ES concept. 'ES-based approaches' do share some core characteristics, including a focus on the status of ecosystems, and a framing of the human-nature relationship in terms of how nature delivers services to humans. There is emphasis on the benefits that humans obtain from nature, recognising the role of humans in assigning values to ecosystem services. The study of ecosystems in terms of human wellbeing represents a novel perspective that requires integration of natural and social sciences, whereas ecologists and other natural scientists have traditionally studied ecosystems in terms of biogeochemical cycles, energy flows, species behaviour, population dynamics, etc. ES-based approaches are also driven by the objective of incorporating ES values into decision-making, and imply the identification of ES and a qualitative or quantitative assessment of their status and value.¹³

This Chapter provides a foundation to situate PES and legal frameworks for PES within the broader ES discourse and policy context. Section 2.2 presents an overview of the origins and development of the ES concept, and analyses how ES relates to broader principles of sustainable development, the Ecosystem Approach and Integrated Water Resources Management. Section 2.3 reviews the foundational ES framework, which sets out categories of ES and describes how ecosystems relate to human wellbeing. Section 2.3.2 elaborates on the link between ecosystem services, water, and the protection of drinking water, in order to inform the case studies in Chapters 4, 5 and 6, which each give specific attention to PES to protect hydrological services and drinking water (in particular the case studies in Chapter 6, which revolve entirely around drinking water protection). Section 2.4 examines the application of ES-based approaches, including advancements

¹² J Martin-Ortega, RC Ferrier and IJ Gordon 'Water Ecosystem Services: Moving Forward', in J Martin-Ortega et al. (eds) *Water Ecosystem Services: A Global Perspective* (Cambridge University Press 2015).

¹³ *ibid.*

and challenges in the assessment and valuation of ES, and examples of how ES can be utilized in decision-making. Section 2.5 provides a critical analysis of the contribution of ES to environmental policy, considering conflicting perspectives on its strengths and drawbacks. Section 2.6 provides a summary of conclusions and identifies key themes that will be explored in the case studies.

2.2 Background and Context

2.2.1 Origins and Development of the Ecosystem Services Concept

While ES terminology has become mainstream in environmental policy over the past two decades, it is not novel in making the connection between ecosystems and human wellbeing. An awareness of human dependence on nature can be found far back in early societies.¹⁴ For example, in 400 B.C., Plato cautioned that deforestation in ancient Greece had led to the erosion of productive top soils and impaired the land's capacity to retain water, drying up springs.¹⁵ Many Indigenous cultures are also based on a deep understanding of interconnectedness with surrounding ecosystems.¹⁶ Recent discourse around the ES concept has advanced the consideration of these connections in the context of current environmental and economic development challenges.

Traces of the idea of ecosystem services as a rationale for ecosystem protection can be found in the early American nature conservation movement, for example, in works such as Marsh's 'Man and Nature' in the late nineteenth century.¹⁷ In the 1940s, Aldo Leopold and other conservationists began to explore the reliance of industrialized economies on nature.¹⁸ The use of the term 'environmental services' can first be located in the 1974 Study of Critical Environmental

¹⁴ Gómez-Baggethun et al. supra (n 10).

¹⁵ Plato, *Critias* (B Jowett tr, Macmillan and Co 1892) <<http://classics.mit.edu/Plato/critias.html>>, accessed February 9, 2018; GC Daily (ed.) *Nature's Services: Societal Dependence on Natural Ecosystems* (Island Press 1997).

¹⁶ The ES concept is consistent with some Indigenous worldviews, however, Indigenous perspectives on ES have been under-explored in ES discourse, and the contribution of ecosystems to Indigenous wellbeing has not typically been fully represented in ES frameworks: KK Sangha and J Russell-Smith 'Towards an Indigenous Ecosystem Services Valuation Framework: A North Australian Example' (2017) 15(3) *Conservation & Society* 255; KK Sangha et al., 'Ecosystems and Indigenous Well-being: An Integrated Framework' (2017) 4 *Global Ecology and Conservation*, 197; P Pascua et al. 'Beyond Services: A Process and Framework to Incorporate Cultural, Genealogical, Place-based, and Indigenous Relationships in Ecosystem Service Assessments' (2017) (26B) *Ecosystem Services* 465; M Roué and Z Molnár (eds.) *Knowing our Lands and Resources: Indigenous and Local Knowledge of Biodiversity and Ecosystem Services in Europe and Central Asia* (UNESCO 2017).

¹⁷ HA Mooney and PR Ehrlich 'Ecosystem Services: a Fragmentary History' in GC Daily (ed.) *Nature's Services: Societal Dependence on Natural Ecosystems* (Island Press 1997).

¹⁸ A Leopold, *Sand County Almanac, and Sketches Here and There*, (Oxford University Press 1949).

Problems led by the Massachusetts Institute of Technology,¹⁹ a pioneering interdisciplinary research effort to assess the impacts of wide-scale environmental change. The term ‘ecosystem services’ appeared in academic literature in the early 1980s,²⁰ continued to develop in the 1990s, and became mainstream in the 2000s.²¹

A number of prominent conservation scholars collaborated on the 1997 book *Nature’s Services*, with the explicit objective to remedy “the near total lack of public appreciation of societal dependence upon natural ecosystems.”²² This major initiative synthesized knowledge on ecosystem services and undertook a preliminary assessment of their economic value, describing services associated with all of the earth’s major biomes and linking their value to different sectors of the economy. Also in 1997, the journal *Nature* published an oft-cited article that estimated the global value of a range of ecosystem services at between US\$16-54 trillion per year, compared to a global GNP of US\$18 trillion at the time.²³ While methodologies for ES valuation have been debated and evolved since this early attempt, research has continued to demonstrate the high value of nature in a variety of social and economic contexts, and the steep costs to replace natural systems once they are degraded, as discussed in section 2.3.5, below.

In 2005, the *Millennium Ecosystem Assessment* (MEA) was a defining initiative that propelled the ES concept into mainstream environmental policy at the international level. Coordinated by the United Nations Environment Program between 2001 and 2005, the MEA undertook a comprehensive global-level assessment of ecosystem services,²⁴ involving over 1,300 scientists from 95 countries. It drew on information gathered in the context of four international conventions: the Convention on Biological Diversity, the United Nations Convention to Combat Desertification, the Ramsar Convention on Wetlands, and the Convention on Migratory Species. The MEA was significant not just in its scope as a global assessment of the state of the environment, but also in its adoption of the ES approach, explicitly linking environmental indicators with indicators of human wellbeing.

¹⁹ *Man’s Impact on the Global Environment: Report of the Study of Critical Environmental Problems* (MIT Press 1974).

²⁰ See for example P Ehrlich and A Ehrlich, *Extinction: The Causes and Consequences of the Disappearance of Species* (Random House 1981).

²¹ Gómez-Baggethun et al. supra (n 10).

²² GC Daily (ed.) *Nature’s Services: Societal Dependence on Natural Ecosystems* (Island Press 1997) xv.

²³ R Costanza, et al, ‘The value of the world’s ecosystem services and natural capital’ (1997) 387 *Nature* 260.

²⁴ MEA, supra (n 1).

The MEA found that sixty percent (15 out of 24) of the ecosystem services examined were being degraded or used unsustainably, and that decreased capacity of ecosystems to provide services posed a significant barrier to sustainable development goals. Recognizing that rapid and extensive changes to ecosystems over the past 50 years have contributed to substantial net gains in human well-being and economic development, the MEA warns that these gains have been achieved at growing costs in the form of the degradation of many ecosystem services, increased risks of nonlinear changes, exacerbation of poverty for some groups of people, and diminished benefits from ecosystems for future generations. The MEA urges that many options exist to conserve or enhance specific ecosystem services in ways that support sustainable development, reduce negative trade-offs or that provide positive synergies with other ecosystem services.

Another significant driver of ES policy on the international stage is *The Economics of Ecosystems and Biodiversity* (TEEB), an ongoing initiative of the environment ministers of the G8+5 countries, with a mandate to coordinate research on the economic benefits of biodiversity and to develop strategies to shift economic incentives in favour of biodiversity protection. TEEB has advanced methodology for economic analysis of ecosystems and biodiversity,²⁵ and led directed research on the economic value of ecosystem services connected to specific ecosystems, including on water and wetlands.²⁶ TEEB has also developed policy-oriented guidance on adopting an ecosystem services approach, including in national,²⁷ local and regional policy,²⁸ as well as in business decisions,²⁹ urban planning.³⁰ The United Kingdom also set a globally significant example by undertaking a comprehensive national-level assessment of ES in 2011.³¹

2.2.2 Situating ES in Environmental Policy

The ES concept developed in the context of a substantial history of international environmental policy recognizing the links between the environment and human economies and societies, and the need to balance development with environmental protection. The discussion

²⁵ Kumar, supra (n 2).

²⁶ D Russi et al. *The Economics of Ecosystems and Biodiversity for Water and Wetlands* (Ramsar Secretariat 2013); D Russi and P ten Brink, *Natural Capital Accounting and Water Quality: Commitments, Benefits, Needs and Progress: TEEB Briefing Note* (Earthscan 2013).

²⁷ P ten Brink (ed.) *The Economics of Ecosystems and Biodiversity in National and International Policy Making* (Earthscan 2011).

²⁸ H Wittmer and H Gundimeda (eds.) *The Economics of Ecosystems and Biodiversity in Local and Regional Policy and Management* (Earthscan 2012).

²⁹ J Bishop (ed.) *The Economics of Ecosystems and Biodiversity in Business and Enterprise* (Earthscan 2012).

³⁰ *TEEB Manual for Cities: Ecosystem Services in Urban Management* (TEEB 2011).

³¹ *UK National Ecosystem Assessment (UKNEA): Synthesis of the Key Findings* (UNEP-WCMC 2011).

below highlights how the ES concept relates to three dominant principles in environmental policy: Sustainable Development, the Ecosystem Approach, and Integrated Water Resources Management. The ES concept fits within these overarching principles, and language consistent with the ES concept is reflected in several key international environmental policy documents. ES-based approaches can also be viewed as diverging from these principles by adopting an anthropocentric perspective that draws the focus to human interests. This discussion of the relationship between ES and broader policy concepts provides background for the case studies presented in Chapters 4, 5 and 6, which will explore how the legal and policy frameworks integrate PES into broader policy around sustainable development, environment and water.

Sustainable Development. The principle of sustainability and the overarching objective of sustainable development are widely accepted in environmental law and policy, while their meaning continues to evolve and varies according to context.³² The Stockholm Declaration resulting from the 1972 UN Conference on the Human Environment set out for the first time common principles to guide environmental protection and economic development, marking early recognition of the need for integrated approaches to concerns about environmental quality, economic growth and poverty.³³ The 1987 Brundtland Report of the World Commission on the Environment and Development, *Our Common Future*, further articulated a vision of sustainability based on balancing the ‘three pillars’ of the environment, the economy and society. It defined the now widely used principle of Sustainable Development, being: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”³⁴

The 1992 United Nations Conference on Environment and Development in Rio de Janeiro, commonly referred to as the Earth Summit, was a landmark in environmental law³⁵, resulting in Agenda 21,³⁶ a non-binding action plan for sustainable development, as well as the Framework Convention on Climate Change,³⁷ the Convention on Biological Diversity³⁸ and United Nations

³² J Benidickson et al. (eds) *Environmental Law and Sustainability after Rio* (Edward Elgar Publishing 2011).

³³ Declaration of the United Nations Conference on the Human Environment, U.N. Doc. A/Conf.48/14/Rev. 1(1973).

³⁴ World Commission on Environment and Development, *Our Common Future* (Oxford 43).

³⁵ Benidickson et al. *supra* (n 32).

³⁶ Agenda 21, UN Doc A/Conf.151/26 (1992).

³⁷ United Nations Framework Convention on Climate Change, U.N. Doc. A/AC.237/18 (Part II) (1992).

³⁸ Convention on Biological Diversity, 1760 U.N.T.S. 69 (1992).

Convention to Combat Desertification.³⁹ Particularly relevant to the later development of ES approaches⁴⁰ was the recognition in Agenda 21 of the need “to restructure the decision-making process so that consideration of socio-economic and environmental issues is fully integrated”.⁴¹ The need for integration of environment and economic considerations with respect to water resources in particular was also recognized: “the extent to which water resources development contributes to economic productivity and social well-being is not usually appreciated.”⁴²

The 2012 UN Conference on Sustainable Development, commonly referred to as Rio+20, and its outcome document, *The Future We Want*, revisited sustainable development in the twenty-first century context.⁴³ The ES concept is reflected in several places. There is reference to “maintaining the healthy functioning of the Earth’s ecosystems,”⁴⁴ rather than simply environmental protection. The document also recognizes “the key role that ecosystems play in maintaining water quantity and quality,”⁴⁵ and the need to “maintain natural ecological processes that support food production systems.”⁴⁶ Careful wording in several parts evidences both a commitment to protecting nature premised on its inherent worth and consideration of economic costs and benefits. For example, the “intrinsic value of biological diversity” is reaffirmed,⁴⁷ and it is noted that “some countries recognize the rights of nature.”⁴⁸ At the same time, the “green economy [is considered] as one of the important tools available for achieving sustainable development and could provide options for policymaking, but should not be a rigid set of rules.”⁴⁹ Furthermore, it recognizes that “innovative sources of financing can play a role in complementing sources of financing for sustainable development.”⁵⁰

³⁹ United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, 1954 UNTS 3 (1994).

⁴⁰ A Rieu-Clarke and C Spray ‘Ecosystem Services and International Water Law: Towards a More Effective Determination and Implementation of Equity?’ (2013) 16(2) PER <<http://dx.doi.org/10.4314/pej.v16i2.3>>, accessed 21 April 2018.

⁴¹ Agenda 21 supra (n 36), Ch. 8.

⁴² Agenda 21, supra (n 36), Ch. 18.

⁴³ *The Future We Want* GA Res 66/288, UN GAOR, 66th sess, Agenda Item 19, (11 September 2012).

⁴⁴ *ibid*, para 56.

⁴⁵ *ibid*, para 122.

⁴⁶ *ibid*, para 111.

⁴⁷ *ibid*, para 197.

⁴⁸ *ibid*, para 39.

⁴⁹ *ibid*, para 56.

⁵⁰ *ibid*, para 253.

Human dependency on the environment has also been recognized in economic development policy focused on poverty alleviation. The eight Millennium Development Goals (MDGs) established following the Millennium Summit of the United Nations in 2000 included MDG 7 “Ensuring Environmental Sustainability”.⁵¹ The seventeen Sustainable Development Goals (SDGs) adopted in 2015 went further in integrating ecosystem considerations into a number of the goals.⁵² Most relevant here, SDG 6 is to “[e]nsure availability and sustainable management of water and sanitation for all,”⁵³ and includes the target to “[b]y 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.”⁵⁴ This represents a significant shift towards an ecosystem-based approach to guide the delivery of water and sanitation services.⁵⁵

The *Millennium Ecosystem Assessment* emphasized the connection between ecosystem services and the MDGs, recognizing that the regions facing the greatest development challenges overlap with the regions where ecosystems and ecosystem services are most deteriorated.⁵⁶ For example, most of the world’s poorest people live in rural areas that are more closely dependent on local ecosystems for food provision. Poorer regions are also highly vulnerable to changes in watershed services that affect the availability or quality of water and occurrence of water-borne disease, and to storm and flood damaged linked to the loss of ecosystems such as wetlands, mangroves, or coral reefs, and also to the impacts of climate change.⁵⁷

The ES concept is consistent with the broad goals of sustainable development to integrate environmental, social and economic considerations. ES-based approaches can also be seen as a means of implementing the sustainable development principle, providing a more detailed framework to articulate human-environment relationships. The attention to future generations

⁵¹ Sub-targets: Target 7A: Integrate the principles of sustainable development into country policies and programs; reverse loss of environmental resources; Target 7B: Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss; Target 7C: Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation; Target 7D: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum-dwellers.

⁵² UN General Assembly, *Transforming our World: the 2030 Agenda for Sustainable Development* (A/RES/70/1, 21 October 2015).

⁵³ *ibid*, Goal 6.

⁵⁴ *ibid*, Target 6.6.

⁵⁵ UN Water, *Integrated Monitoring Guide for Sustainable Development Goal 6 on Water and Sanitation* (14 July 2017), 5.

⁵⁶ MEA *supra* (n 1).

⁵⁷ *Ibid*.

within the sustainable development definition is also consistent with the longer time frames within which some ecosystem services are realized, and the idea that trade-offs between ecosystem services may be experienced across generations. ES also adds something distinct to the policy discourse, going beyond a ‘three-tiered’ approach considering “environmental” “social” and “economic” factors, to consider how environmental factors *are also* social and economic factors. Beyond the discrete pillar of “environment”, ES makes the case for “nature based solutions” to a wide range of social and economic problems.⁵⁸

The Ecosystem Approach. The Conference of the Parties for the Convention on Biological Diversity (CBD) adopted the Ecosystem Approach as the primary framework to guide its implementation.⁵⁹ The Ecosystem Approach is based on a set of twelve principles, commonly referred to as the Malawi principles, comprising “a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.”⁶⁰ This includes principles for decentralization, stakeholder participation, and appropriate use of scientific information about ecosystems, along with recognition of the connection to human societies and economies. A key feature of the ecosystem approach is its focus on interconnectedness and the study of interactions within whole systems, rather than individual components.⁶¹

The ES concept can be observed within the broader Ecosystem Approach. For example, Principle 5 establishes that: “[c]onservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.” Furthermore, Principle 4 reflects recognition of the economic value of ES, and is suggestive of payments for ecosystem services as an appropriate approach within biodiversity policy. It states that in an economic context, any ecosystem-management programme should: reduce market distortions that adversely affect biological diversity; align incentives to promote biodiversity conservation and sustainable use; and, internalise costs and benefits to the extent feasible.

⁵⁸ M Potschin et al. ‘Ecosystem Services in the Twenty-First Century’ in M Potschin et al. (eds) *Routledge Handbook of Ecosystem Services* (Routledge 2016); United Nations World Water Assessment Programme, *The United Nations World Water Development Report 2018: Nature-Based Solutions for Water* (UNESCO 2018).

⁵⁹ United Nations Convention on Biological Diversity *supra* (n 34); Rieu-Clarke and Spray *supra* (n 36).

⁶⁰ Fifth Ordinary Meeting of the Conference of the Parties to the Convention on Biological Diversity, Nairobi, Kenya, Decision V/6 (26 May 2000).

⁶¹ Rieu-Clarke and Spray *supra* (n 40).

The updated Strategic Plan for Biodiversity for 2011-2020⁶² and Aichi Biodiversity Targets also specifically bring ecosystem services into implementation of the CBD. The Strategic Plan notes growing knowledge about ecosystem services, referring to work led by TEEB, and includes several targets that indicate a movement towards ecosystem-service based approaches. Strategic Goal A is to “[a]ddress the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society,” including through Target 2, to incorporate biodiversity values into national and local policies and accounting systems, and Target 3, which points to the need to develop economic incentives for biodiversity conservation and remove harmful incentives.⁶³ Strategic Goals D is to “[e]nhance the benefits to all from biodiversity and ecosystem services.” Equity considerations are emphasized in Target 14, identifying a particular need to restore and safeguard ecosystems that provide essential ecosystem services to vulnerable demographics, including services related to water, health and livelihoods.

The Ecosystem Approach can be seen as a critical benchmark in support of ecosystem services-based approaches, but there are important differences between the two. The holistic, integrated ES perspective is rooted in the Ecosystem Approach, but ES is distinct in its anthropocentric focus. ES-based approaches extend beyond the more general principles of integration and science-based decision-making set out in the Ecosystem Approach, towards detailed assessment and management tools focused on values and services that flow from ecosystems to humans.⁶⁴ Also, while the Ecosystem Approach consists of a set of internationally agreed-upon norms, which encompass the concept of ecosystem services, there are a variety of possible ES-based approaches that advance the ES concept, often towards broader goals of integration.

Integrated Water Resources Management. International water policy evolved in the same context as sustainable development policy, and the movement towards coordinated, integrated ecosystems management as described above. Water was one of the key issues under the umbrella Declaration of the UN Conference on the Human Environment in 1972. The Mar Del Plata Conference followed in 1977, focusing on water management and endorsing Integrated Water

⁶² Tenth meeting of the Conference of the Parties to the Convention on Biological Diversity, Nagoya, Japan, Decision X/2 (29 October 2010).

⁶³ See guidance on implementing this target: J Rode, H Wittmer, and G Watfe, *Implementation Guide for Aichi Target 3 – A TEEB perspective* (German Federal Agency for Nature Conservation 2012).

⁶⁴ Rieu-Clarke and Spray supra (n 40).

Resource Management (IWRM).⁶⁵ The Global Water Partnership's definition of IWRM is widely accepted, stating:

*IWRM is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.*⁶⁶

Over the past four decades, IWRM has become the leading approach to water management, with eighty percent of countries embarking on reforms to improve water resources management based on the application of integrated approaches.⁶⁷ The ES concept is highly compatible with the IWRM process, which considers the flow of water through the landscape and makes linkages between uses of land and related resources and impacts on water. These linkages will be discussed further from an ES perspective in section 2.3.2. IWRM has been early area for application of ES-based approaches,⁶⁸ with some examples noted in section 2.4.1.

Some authors suggest that ES-based approaches have the potential to address some of the standoffs in IWRM implementation by shedding new light on deadlocks between competing interests, revealing deeper relationships and potentially new possibilities for synergy.⁶⁹ ES has also been positioned as an “alternative entry point” for applying IWRM in a pragmatic way, by supporting a service-oriented approach that complements existing IWRM strategies by focusing specifically on ecosystem services relevant to priorities of water, sanitation and irrigation.⁷⁰ ES has also been considered useful in implementing IWRM through the development of payments for ecosystem services to contribute to IWRM funding.⁷¹

⁶⁵ UN General Assembly, Follow-up to and implementation of the Mar del Plata Action Plan of the United Nations Water Conference, A/RES/34/191 (18 December 1979).

⁶⁶ J Hassing et al. *Integrated Water Resources Management in Action* (DHI Water Policy and UNEP-DHI Centre for Water and Environment 2009) 3.

⁶⁷ *Status Report on the Application of Integrated Approaches to Water Resources Management* (United Nations Environment Programme, 2012).

⁶⁸ BR Cook and CJ Spray ‘Ecosystem services and integrated water resource management: Different paths to the same end?’ (2012) 109 *Journal of Environmental Management* 93.

⁶⁹ S Liu et al., ‘Bringing ecosystem services into integrated water resources management’ (2013) 129 *Journal of Environmental Management* 92.

⁷⁰ J Butterworth et al. ‘Finding practical approaches to Integrated Water Resources Management’ (2010) 3(1) *Water Alternatives* 68.

⁷¹ Status Report supra (n 67).

Sustaining the delivery of ES can be positioned within the objectives of IWRM, where the maximization of social and economic welfare can be viewed as maximizing ES.⁷² However, while both ES and IWRM focus on socioeconomic/ecological linkages, their underlying assumptions can be distinguished. Where IWRM aims *not to compromise* ecosystems, the focus is implicitly on negative tradeoffs between social and economic benefits and ecosystems. In contrast, the ES concept focuses on the positive relationship between supporting ecosystem integrity *in order to* provide greater social and economic benefits.

In practice, some argue that ES and IWRM have evolved into essentially the same concept. While one presumed difference would be IWRM's emphasis on water, the coordination of land and water resources has expanded IWRM into realms of environmental management generally. Also like ES, IWRM entails consideration across spatial and temporal scale and multi-stakeholder perspectives.⁷³ While ES can be thought to have originated with emphasis on environmental wellbeing and IWRM on social wellbeing, they arrive at the same point – both focused on integrated human-environment considerations, in order to inform policy to negotiate competing interests. Both ES and IWRM strive towards the ideal of win-win solutions, which may be impossible to fully achieve. Integrated management is challenging and complex, and critiques of IWRM have argued that the heavy burden of pursuing the IWRM ideal have frustrated implementation and results.⁷⁴ Similar critiques leveled against the ES concept are discussed further in section 2.4.2.

2.3 The Ecosystem Services Framework

2.3.1 Ecosystem Service Classification

The 2005 Millennium Ecosystem Assessment set out the foundational ES classification framework, describing four categories of ecosystem services according to their relationship to human wellbeing:⁷⁵

- *Provisioning services*, which are the more familiar, tangible products obtained from ecosystems, including all nutritional, material and energetic outputs (for example: crops,

⁷² Liu et al. *supra* (n 69), 97

⁷³ Rieu-Clarke and Spray *supra* (n 40); Cook and Spray *supra* (n 68); For an example of this perspective see: *Coordinating land and water governance for food security and gender equality* (Global Water Partnership No. 24, 2017).

⁷⁴ AK Biswas 'Integrated Water Resources Management: a Reassessment' (2004) 29(2) *Water International* 248.

⁷⁵ MEA *supra* (n 1).

fish stocks, plant-derived medicines, timber, fuels, and surface and groundwater used for drinking, irrigation, industrial use, and hydro electricity, etc.);

- *Regulating services*, which are benefits obtained from the regulation of ecosystem processes, including all the ways in which living organisms can mediate or moderate the environment in ways that affect humans (for example: filtration of pollutants by wetlands, climate regulation through carbon storage in plants, and pollination of plants by bees and bats, etc.);
- *Cultural services*, which refer to a range of non-material, and normally non-consumptive, outputs of ecosystems that affect physical and mental states of people (for example: physical settings or species with value to recreation, spiritual, aesthetic or educational values);
- *Supporting services*, on which all other services depend. This includes fundamental processes such as primary production of energy and nutrients, nutrient cycling through ecosystems, photosynthesis, which produces oxygen necessary for most living organisms, and the water cycle.

The MEA framework has been widely adopted, and has also provided the basis for revised iterations of these categories. Most notably, the Common International Classification of Ecosystem Services (CICES) was developed from work undertaken by the European Environment Agency, as part of a global initiative on environmental accounting led by the United Nations Statistical Division, and is currently one of the most widely used classifications.⁷⁶ One important change from the MEA classification is that CICES does not include the category of ‘supporting services’, but encompasses these within a broader category called ‘regulating and maintenance services’, which include the underlying structures, process and functions that characterize ecosystems. CICES also expounds a more detailed hierarchy of final ecosystem services, dividing them into sections (e.g., regulating and maintenance services), divisions (e.g., regulation of physical, chemical and biological conditions), and groups (e.g., water conditions).

It is worth noting that ecosystem services can also be described and categorized in various other ways. For example, ES can be grouped according to their relationship with certain species or

⁷⁶ Common International Classification of Ecosystem Services (CICES), Version 5.1 <<https://cices.eu>> accessed 8 May 2018.

groups of species.⁷⁷ Alternatively, they can be grouped descriptively according to the type of benefits they provide, such as services providing renewable resource goods or non-renewable resource goods, physical structures, bio-geochemical services, or information services.⁷⁸ They can also be described according to their spatial characteristics: for example, carbon sequestration can be considered a global service because carbon stored in one location has far-reaching impacts throughout the atmosphere, while filtration of water through wetlands or forests occurs a regional scale, and services such as pollination occur within a more localized area.⁷⁹ As discussed below, the watershed is often the appropriate scale for describing the range of hydrological services related to the water cycle. It is common for practical purposes to group ecosystem services in bundles that are associated with certain types of ecosystems or landscapes, such as forests, wetlands, marine ecosystems, or agricultural lands.⁸⁰ The figure below, taken from the United Kingdom's National Ecosystem Assessment, provides an example of types of ecosystem services associated with different habitat types.

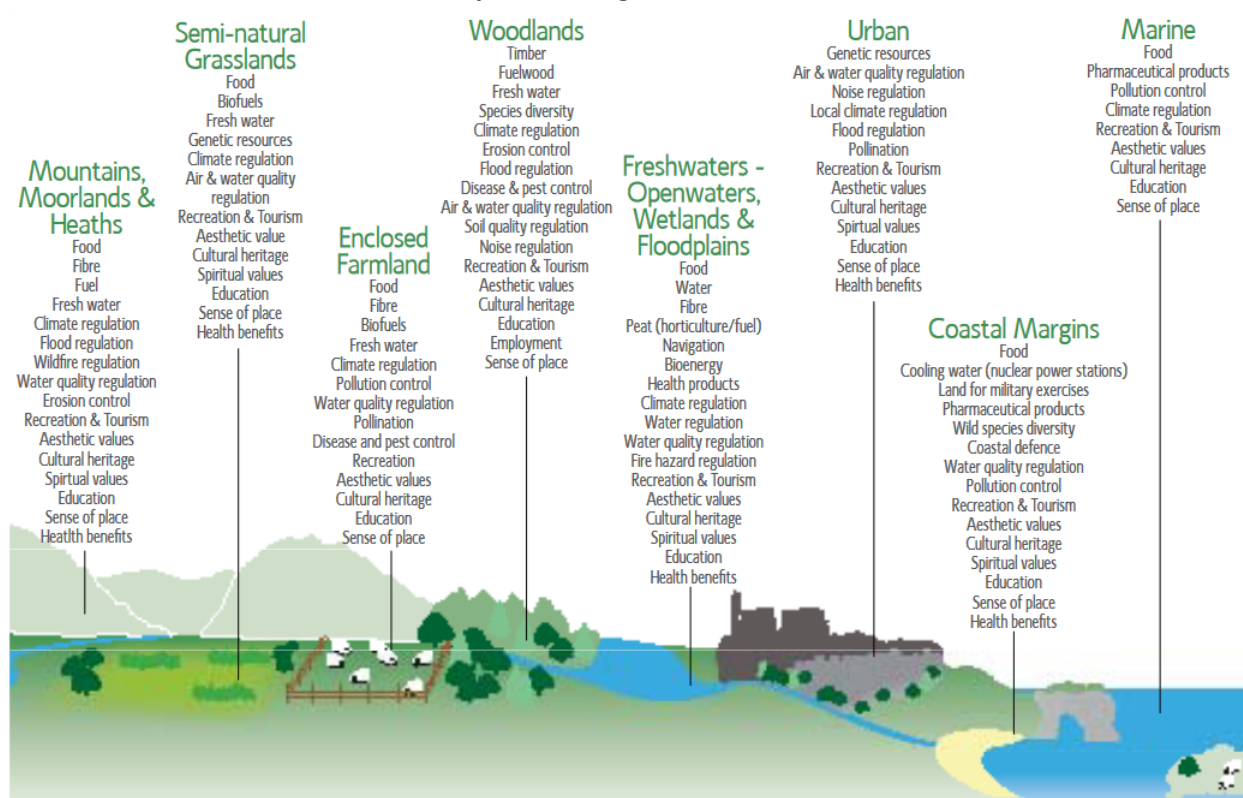
⁷⁷ J Norberg 'Linking Nature's services to ecosystems: Some general ecological concepts' (1999) 29(2) *Ecological Economics*, 183.

⁷⁸ J Alcamo and EM Bennett (eds.) *Ecosystems and human well-being: a framework for assessment* (Island Press 2003); F Moberg and C Folke 'Ecological goods and services of coral reef ecosystems' (1999) 29 *Ecological Economics* 215.

⁷⁹ R Costanza 'Ecosystem services: multiple classification systems are needed' (2008) 141 *Biological Conservation* 350.

⁸⁰ C Raudsepp-Hearne, GD Peterson and EM Bennett 'Ecosystem service bundles for analyzing tradeoffs in diverse landscapes' (2010) 107(11) *Proceedings of the National Academy of Sciences of the United States of America*, 5242.

Figure 2.3.1 The eight Broad Habitats assessed in the United Kingdom National Ecosystem Assessment and examples of the goods and services derived from each.⁸¹



2.3.2 Hydrological Ecosystem Services

An ES perspective is particularly relevant to the upstream/downstream relationship that characterizes freshwater ecosystems: the amount and quality of water downstream can be linked to the condition of ecosystems upstream, and understanding this relationship is crucial to water management decisions.⁸² The overarching process by which water circulates through the earth and atmosphere, known as the water cycle, can be understood as the umbrella maintenance or supporting service that underlies the group of services sometimes referred to as 'hydrological services'.⁸³ Biodiversity plays a fundamental role in water cycles, and loss of biodiversity can compromise related hydrological services.⁸⁴ Forests and mountain ecosystems are the most important providers of hydrological services, generating sources of renewable fresh water to at least two thirds of the world's population, and wetlands are also critical in many regions. The

⁸¹ UKNEA supra (n 31), 17.

⁸² Rieu-Clarke and Spray supra (n 36).

⁸³ J Martin-Ortega, et al. (eds.) *Water Ecosystem Services: A Global Perspective* (Cambridge University Press 2015).

⁸⁴ CJ Vörösmarty et al. 'Global threats to human water security and river biodiversity' (2010) 467 *Nature* 555.

management of modified landscapes, such as land used for agriculture and ranching, also has important impacts on hydrological services.⁸⁵

Water relates to each of the categories of ecosystem services. It can be categorized as a provisioning service, in that ecosystems provide sources of surface and groundwater used for drinking water supplies, irrigation, industrial use, and hydro-electricity, which supports economic productivity in those sectors, and also has direct physical benefits to human health. Aquatic environments and water itself also provide cultural services. Water has religious and ceremonial uses in many cultures. It provides for some of the most popular recreational uses of the environment such as beach-going, swimming, water sports, and boating. These services provide many benefits with non-monetary value: for example, time spent near lakes, rivers and other water environments has been shown to positively impact psychological wellbeing. They also provide economic benefits, such as supporting tourism sectors, and enhancing real estate values of properties with proximity to water.⁸⁶

Ecosystems provide a number of regulating services that impact water quality. For example, as water moves through the natural environment, the result is regulation of mineral, sediment and bacteria levels, maintenance of water temperature, the detoxification of pollutants, and the filtration of wastewater. Ecosystems are also critical to regulating the quantity and timing of water flows, providing services such as: control of erosion, soil protection, flood prevention, reduction of peak flows, landslide prevention, and fostering recharge of groundwater and surface water by capturing rainfall. This results in numerous benefits to physical safety and the economy, for example, by reducing water borne-diseases, lowering the cost of drinking water treatment, and mitigating flood and storm damage.⁸⁷

Most hydrological services are generated at the watershed level. A watershed (a term used interchangeably with 'catchment'), is an area of land that feeds water from tributaries into a common river basin, through the process of precipitation draining through the landscape, including groundwater. Commonly, a critical factor in the supply of hydrological services is the extent of

⁸⁵ MEA supra (n 1); Russi et al. supra (n 26).

⁸⁶ MEA supra (n 1); CICES supra (n 76); Martin-Ortega supra (n 83).

⁸⁷ Martin-Ortega supra (n 83); United Nations Environment Programme and International Union for Conservation of Nature (UNEP and IUCN), *Green Infrastructure Guide for Water Management: Ecosystem-based management approaches for water-related infrastructure projects* (UNEP 2014).

natural land cover in the watershed, such as trees, wetland vegetation or other vegetation.⁸⁸ Watershed-based incentive schemes, in most cases aimed at protecting drinking water, have so far been the most prominent and successful examples of implementing payments for ecosystem services.⁸⁹

The protection of ecosystem services linked to drinking water specifically can be understood as being within the scope of activities referred to as 'source water protection'. 'Source water' refers to raw water from streams, lakes or groundwater aquifers that are used as sources of drinking water supply systems.⁹⁰ PES schemes related to drinking water will typically target delineated areas within a watershed that feed the source water for a municipality or community. Protecting the quality and quantity of source waters is a critical first step in achieving safe drinking water systems. Even when the focus is primarily on human health, source water protection can reduce water treatment costs, and have wider benefits by protecting aquatic ecosystems.⁹¹ Some source water protection measures, such as those aimed at preventing pollutants from entering the source watershed, do not depend on ecosystem services. However, many of the measures typically undertaken as part of source water protection entail the protection or restoration of natural landscapes, which provide ecosystem services related to water quality and quantity.

As water flows over land, it picks up pollutants such as nutrients from fertilizer and bacteria from animal wastes. Vegetation along the flow paths can capture these pollutants and reduce the load reaching source water. Furthermore, vegetation helps to regulate water temperature, which is important to maintaining levels of dissolved oxygen, reducing instances of toxic algae blooms. Erosion also impacts water quality, resulting in excess sediment entering drinking water systems, which can carry nutrients and pathogens, and can require costly additional filtration treatments. Erosion is exacerbated in modified landscapes where vegetation is removed, exposing the soil to wind and runoff from rain or melting snow. Deforestation, land clearing for agriculture and poor agricultural practices can all lead to significantly increased erosion. In particular, the removal of

⁸⁸ Russi et al. supra (n 26); T Gartner et al. (eds) *Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States* (World Resources Institute 2013).

⁸⁹ G Bennett and F Ruef, *Alliances for Green Infrastructure State of Watershed Investment 2016*, (Forest Trends, 2016).

⁹⁰ R de Loë and G Simms 'An Introduction to Source Water Protection Governance: Briefing Note #1' (Canadian Water Network, April 2009); Runoff and Erosion Protection and Additional Best Management Practices (Conservation Ontario 2012); R Abell et al. *Beyond the Source: The Environmental, Economic and Community Benefits of Source Water Protection* (The Nature Conservancy 2017).

⁹¹ *ibid*

riparian vegetation along the edges of waterways (or riparian ‘buffers’) can cause streambanks to collapse, creating a large source of excess sediment. Riparian buffers are also important as a last defence against pollutants entering waterways.⁹²

Vegetation in the watershed, especially wetland areas, also helps water runoff to infiltrate soil. This slows its flow to surface water bodies such as lakes and rivers, and allows recharging of ground water aquifers. The removal of vegetation can cause water to flow too quickly over land into main river channels, causing flooding, and reducing water availability for drinking water systems. These impacts may be extended over months, for example, where the land retains less water during the wet season, reducing dry season flows. On the other hand, invasive species of vegetation can reduce overall water availability by consuming amounts of water disproportionate to what is available in the ecosystem.⁹³

Source water protection measures that protect or restore ecosystem services include the conservation of forests, grasslands or wetlands in targeted areas in the source watershed. Active measures may be taken towards the restoration and revegetation of these areas, by planting native species and the removal of invasive species, or land use may be restricted to allow natural regrowth. This often entails the conservation or restoration of riparian buffers, sometimes requiring the reconstruction of stream banks, and planting of native vegetation with deep, soil-binding roots. It can also include the conservation of wetlands, and sometimes the construction of wetlands in previously drained areas, by altering slopes to re-establish flooding and drainage patterns and planting of wetland vegetation. Agricultural and ranching best management practices are also common as part of source water protection, which can provide ecosystem services, for example, by protecting or installing strips of natural vegetation as buffers between cultivated areas and water bodies, the rotation of crops and grazing areas, targeted planting to stabilize soil, and the removal of some areas of land from production for conservation purposes.⁹⁴

The protection of ecosystems to provide hydrological ecosystem services is increasingly important in approaches to water management, including the delivery drinking water services. This is sometimes referred to as investments in ‘green infrastructure’, where natural or semi-natural ecosystems provide equivalent or similar benefits compared to conventional (built) ‘grey’ water

⁹² *ibid*

⁹³ *ibid*

⁹⁴ *ibid*

infrastructure, often more cost-effectively. The figure below, taken from a guide developed by the United Nations Environment Programme, the International Union for Conservation of Nature and the Nature Conservancy, demonstrates the range of water services provided by ecosystems that might supplement or complement traditional infrastructure.

Figure 2.3.2 Green Infrastructure Solutions for Water Resources Management⁹⁵

Water management issue (Primary service to be provided)		Green Infrastructure solution	Location				Corresponding Grey Infrastructure solution (at the primary service level)
			Watershed	Floodplain	Urban	Coastal	
Water supply regulation (incl. drought mitigation)		Re/afforestation and forest conservation					Dams and groundwater pumping Water distribution systems
		Reconnecting rivers to floodplains					
		Wetlands restoration/conservation					
		Constructing wetlands					
		Water harvesting*					
		Green spaces (bioretention and infiltration)					
		Permeable pavements*					
Water quality regulation	Water purification	Re/afforestation and forest conservation					Water treatment plant
		Riparian buffers					
		Reconnecting rivers to floodplains					
		Wetlands restoration/conservation					
		Constructing wetlands					
		Green spaces (bioretention and infiltration)					
		Permeable pavements*					
	Erosion control	Re/afforestation and forest conservation					Reinforcement of slopes
		Riparian buffers					
		Reconnecting rivers to floodplains					
	Biological control	Re/afforestation and forest conservation					Water treatment plant
		Riparian buffers					
		Reconnecting rivers to floodplains					
		Wetlands restoration/conservation					
	Water temperature control	Re/afforestation and forest conservation					Dams
		Riparian buffers					
		Reconnecting rivers to floodplains					
		Wetlands restoration/conservation					
		Constructing wetlands					
Green spaces (shading of water ways)							
Moderation of extreme events (floods)	Riverine flood control	Re/afforestation and forest conservation					Dams and levees
		Riparian buffers					
		Reconnecting rivers to floodplains					
		Wetlands restoration/conservation					
		Constructing wetlands					
	Urban stormwater runoff	Establishing flood bypasses					Urban stormwater infrastructure
		Green roofs					
		Green spaces (bioretention and infiltration)					
		Water harvesting*					
	Coastal flood (storm) control	Permeable pavements*					Sea walls
		Protecting/restoring mangroves, coastal marshes and dunes					
		Protecting/restoring reefs (coral/oyster)					

Solutions in the table marked with ‘*’ distinguish built or “grey” elements that interact with natural features and seek to enhance their water- related ecosystem services.

⁹⁵ *Green Infrastructure Guide* supra (n 87), 6.

2.3.3 Linking Ecosystem Services to Human Wellbeing: the Cascade Model

The MEA described a ‘cascade’ effect that characterizes the relationship between ecosystems and human wellbeing: ecosystem services are generated by ecosystem functions, which in turn are underpinned by biophysical structures and processes.⁹⁶ Some critiques of the ES approach, and the MEA framework in particular, have noted that the terms ‘services’ ‘benefits’ and ‘functions’ are used ambiguously, and do not clearly distinguish between the mechanisms by which services are generated and the services themselves.⁹⁷ There is debate about the scientific validity of the ecosystem services concept fundamentally. Some argue that, while a useful analogy, the terms used in ES discourse do not accurately reflect scientific knowledge of about ecosystem organization and function.⁹⁸ Others have proposed that the ES framework is consistent with the theoretical basis for systems ecology.⁹⁹ Research since the MEA has sought to clarify and refine the conceptual basis for linking ecosystems to indicators of human wellbeing.

Most notably, a revised cascade model was developed by Haines-Young and Potschin (2016), which has been adopted for use in the Common International Classification of Ecosystem Services. This model makes the important distinction between ‘final ecosystem services’ and ‘ecosystem goods and benefits’. Final ecosystem services are the final outputs of ecosystems, their key characteristic being that they retain a connection to the underlying ecosystem functions, processes and structures that generate them. Ecosystem goods and benefits are things that people create or derive from final ecosystem services, characterized as products or experiences that are not functionally connected to the systems from which they were derived. In this way, there is a clear distinction between the ecosystem outputs as objective aspects of the ES framework, and the normative aspects that relate to how humans interpret those outputs as being beneficial.¹⁰⁰

⁹⁶ RS de Groot, *Functions of Nature: Evaluation of Nature in Environmental Planning, Management and Decision Making* (Wolters-Noordhoff 1992).

⁹⁷ S Banzhaf and J Boyd ‘The Architecture and Measurement of an Ecosystem Service Index’ (Discussion Paper, Resources for the Future 2005); KJ Wallace ‘Classification of ecosystem services: problems and solutions’ (2007) 139 *Biological Conservation* 235.

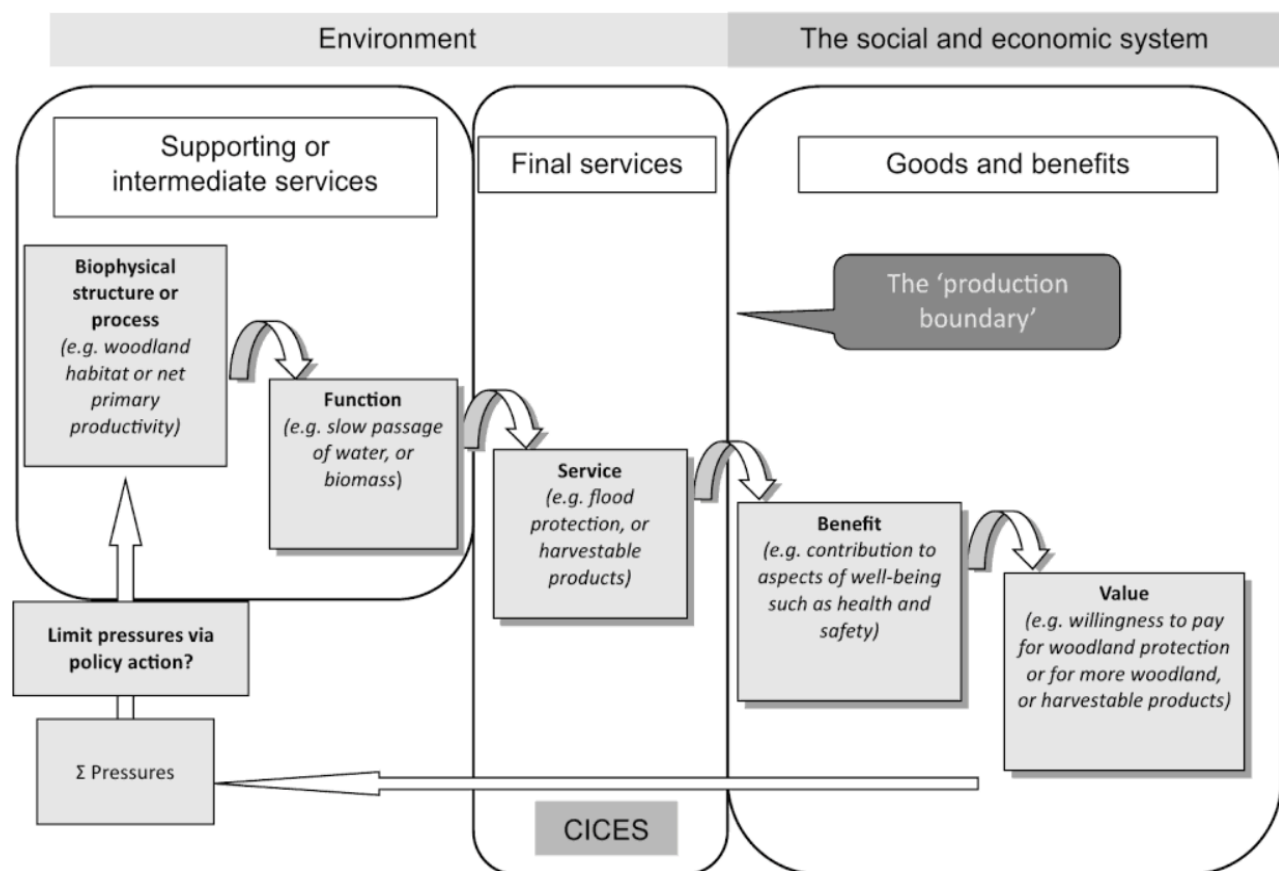
⁹⁸ J Barkmann et al. ‘Confronting unfamiliarity with ecosystem functions: the case for an ecosystem service approach to environmental valuation with stated preference methods’ (2008) 65 *Ecological Economics* 48; MJ Peterson et al. ‘Obscuring Ecosystem Function with Application of the Ecosystem Services Concept’ (2009) 24(1) *Conservation Biology* 113; D Goble ‘What are Slugs Good for? Ecosystem Services and the Conservation of Biodiversity’ (2007) 22(2) *Journal of Land Use* 411.

⁹⁹ A La Notte et al. ‘Ecosystem services classification: A systems ecology perspective of the cascade framework’ (2017) 74 *Ecological Indicators* 392.

¹⁰⁰ M Potschin and R Haines-Young ‘Defining and measuring ecosystem services’ in M Potschin, et al. (eds.) *Routledge Handbook of Ecosystem Services* (Routledge, Taylor & Francis Group 2016); CICES supra (n 72).

The updated model also illustrates how external pressures impact the environment and the resulting flow of ecosystem services. It makes the link that external pressures are influenced by the value humans place on ecosystem goods and benefits, and depicts the role of policy interventions in mitigating those external pressures. Haines-Young and Potschin have noted that the cascade conceptual model is useful as a communications tool, and as a way of mapping out information, which may provide an analytical footing for problem solving and policy decisions. Its purpose is to better understand the relationship between the environment and social and economic systems, rather than to apply the model rigidly, or necessarily in a quantitative way.

Figure 2.3.3 Cascade Model of Ecosystem Services (Haines-Young 2016)¹⁰¹



¹⁰¹ Potschin and Haines-Young supra (n 100), 26.

2.4 Applying Ecosystem Services-Based Approaches

2.4.1 Ecosystem Services Assessment

Access to information on ecosystem-services values by decision-makers is fundamental to coherent policy, and fosters transparency. While there is no formula for an ES-based approach, TEEB guidance outlines generally that an ES-based decision-making process should entail the assessment and valuation of ES (although not always in monetary terms), followed by the explicit consideration of these factors in relation to the decision at hand.¹⁰² The first step involves identifying and assessing the full range of ecosystem services affected and the implications for different groups in society. Distinct from traditional environmental impact assessments, this analysis extends considerations to the impacts on human interest. In order to achieve these policy goals, it is necessary to first establish appropriate ES assessment and valuation procedures. Gaps in knowledge and tools for ES assessment have been highlighted as a challenge for the successful implementation of ES-based approaches.¹⁰³ However, the response to this need is evolving.

The MEA was influential in demonstrating the potential of an ecosystem-services assessment, and provides a high-level, global example of this approach. The MEA contributed to ES knowledge by exploring several well-known environmental issues in terms of ecosystem services. It made several generalized conclusions, finding that the use of provisioning services exceeds sustainable rates, and that this has resulted in the substantial alteration of regulating services and changes to underlying supporting services. For example, water cycles have been altered by large-scale built infrastructure such as dams and river diversions, and land use changes have contributed to an increase in major floods on all continents since the 1940s. Deforestation has also impacted evapotranspiration and changed regional rainfall patterns, and a reduction in natural vegetation has reduced the capacity of ecosystems to filter waste and to produce soil on a global level. The burning of fossil fuels has changed atmospheric composition, interfering with climate regulation. Finally, urbanization has diminished the accessibility of nature and its cultural benefits.¹⁰⁴

The MEA also found that use of provisioning services has increased more slowly than economic growth, indicating that economic development does not necessitate a proportional

¹⁰² Kumar supra (n 2).

¹⁰³ KMA Chan, T Satterfield and J Goldstein 'Rethinking Ecosystem Services to Better Address and Navigate Cultural Values (2012) 74 *Ecological Economics* 8; R Naidoo et al. 'Global mapping of ecosystem services and conservation priorities' (2008) 105(28) *Proceedings of the National Academy of Sciences of the United States of America* 9495.

¹⁰⁴ MEA supra (n 1).

increase in consumptive uses of ecosystems. On a very broad scale, it developed a model depicting global scenarios to forecast the outcome of different sustainable development strategies on the provision of ES. This led to general conclusions intended to guide policy, such as demonstrating how technological advances can mitigate the loss of some ecosystem services, but can lead to eventual breakdown when there is no substitute for supporting services. The best outcome in terms of maintaining ES globally combined investment in technology with management interventions to protect supporting ecosystem services (e.g. via conservation of natural spaces).¹⁰⁵

A number of studies following the MEA examined the trade-offs between multiple ecosystem services in more specific contexts, revealing a number of possible applications and also challenges.¹⁰⁶ As demonstrated in the cascade framework, the ES framework captures both bio-centric and anthropocentric aspects, requiring the integration of quantifiable measurements (e.g. in describing ecosystems functions) and normative judgments (e.g. in determining what are deemed 'ecosystem services' with benefits to humans). This necessitates novel interdisciplinary approaches.¹⁰⁷

Another challenge is that quantitative relationships between aspects of biodiversity, ecosystem components and processes, functions and services are not well understood in many cases, and the generation of this knowledge has lagged behind the popularity of the ES concept.¹⁰⁸ ES analysis has tended to rely on the extension of existing methods of ecosystem assessment to capture ecosystem services.¹⁰⁹ Where specific indicators are lacking to measure ES directly, scientists have tended to use land use and land cover as a proxy for the provision of services.¹¹⁰ The modeling of ES provision in relation to ecosystem processes and management interventions also requires approaches that are able to incorporate indicators on multiple scales ranging from micro-level soil composition to global level atmospheric conditions. Incorporating variables that reflect

¹⁰⁵ *ibid.*

¹⁰⁶ Naidoo et al. *supra* (n 103); SR Carpenter et al. 'Science for managing ecosystem services: Beyond the Millennium Ecosystem Assessment' (2009) 106(5) *Proceedings of the National Academy of Sciences of the United States of America* 1305; EB Barbier et al. 'Coastal ecosystem-based management with nonlinear ecological functions and values' (2008) 319 *Science* 321.

¹⁰⁷ Potschin and Haines-Young *supra* (n 100).

¹⁰⁸ RS de Groot et al. 'Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making' (2010) 7 *Ecological Complexity* 260.

¹⁰⁹ Cook and Spray *supra* (n 68).

¹¹⁰ Kumar *supra* (n 2).

management options across these scales is important to the policy relevance of ES, but is highly complex in terms of modeling.¹¹¹

A key goal of ES assessment is to detect at what point changes in ecosystems and biodiversity result in disruption of ecosystem services.¹¹² This relationship, and relationships between ES, may be highly non-linear. Ecosystem degradation or loss of biodiversity often does not translate directly, proportionately or immediately into loss of services, as ecosystems can be resilient to change up to a threshold, past which rapid decline in services may occur. Different spatial scales are relevant in assessing trade-offs, which may be made between stakeholders and sectors at local, regional, and in some cases international scales. Trade-offs are also often made along temporal scales, including between present and future generations. Another consideration in assessing trade-offs is the reversibility of the impacts on ecosystems, and the likelihood that the degraded ES may be restored.¹¹³ Some authors have concluded that while qualitative level, broad assessments of ES are relatively easy and appealing, quantitative tradeoff analysis encounters challenges because measuring all services is impossible, and interrelationships between services are complex.¹¹⁴

Overall, there has been a significant increase in the state of ES science over the past two decades.¹¹⁵ Assessment measures to include indicators of ecosystem services have grown significantly. There now exist a number of modelling applications and other decision-support tools for systematic ES assessment, developed specifically to be compatible with the ES framework.¹¹⁶ These models can be particularly relevant in policy contexts because they are able to deliver results in terms of monetary values, non-monetary values (e.g. high, medium or low supply of each ES) and also in biophysical values (e.g. area protected or tonnes of carbon sequestered).¹¹⁷ Model-based

¹¹¹ de Groot et al. supra (n 108).

¹¹² *The Economics of Ecosystems and Biodiversity for National and International Policy Makers – Summary: Responding to the Value of Nature* (TEEB 2009).

¹¹³ G Heal et al. 'Protecting natural capital through ecosystem service districts' (2001) 20 *Stanford Environmental Law Journal* 333; MEA supra (n 1).

¹¹⁴ E Primmer and E Furman 'Operationalising ecosystem service approaches for governance: Do measuring, mapping and valuing integrate sector-specific knowledge systems?' (2012) 1 *Ecosystem Services* 85.

¹¹⁵ P Balvanera et al. 'Ecosystem services research in Latin America: The state of the art' (2012) 2 *Ecosystem Services* 56.

¹¹⁶ See KJ Bagstad et al. 'A comparative assessment of decision-support tools for ecosystem services quantification and valuation' (2013) 5 *Ecosystem Services* 27, which describes 17 ecosystem services assessment tools and rate their performance and readiness for widespread application in public- and private-sector decision making.

¹¹⁷ Bagstad supra (n 112); A Guerry et al. 'Modeling benefits from nature: using ecosystem services to inform coastal and marine spatial planning' (2012) 8 *International Journal of Biodiversity Science, Ecosystem Services &*

approaches have been useful in studies such as linking biophysical and economic dimensions of decisions,¹¹⁸ comparing the impact of different mitigation measures and investments in conservation, and mapping policy alternatives for meeting ES and other policy targets.¹¹⁹

National and international-level initiatives are also being undertaken towards developing and improving ES assessment procedures, in order to support policy and decision making at various scales. Work by the TEEB has promoted a global framework to identify a set of key attributes of ecosystem services, which can be built into national environmental indicators (while recognizing that a complete standardized measurement system would be prohibitively time-consuming).¹²⁰ The Intergovernmental Platform on Biodiversity and Ecosystem Services was also established in 2012 as an intergovernmental body under the United Nations to facilitate the generation and sharing of scientific information on ES, now with membership of over 100 governments and a number of non-governmental organizations.¹²¹

2.4.2 Ecosystem Service Valuation

Early ES discourse referred to the value of nature and natural capital mainly as a metaphor to illustrate the ecological blindness of conventional economic accounts, without attempts to rely on economic valuation of nature in decision-making.¹²² ES-based approaches do not necessarily have to entail monetary valuation of ES. A review evaluating twenty pilot studies applying the ES concept observed that many decision-makers wished to examine the consequences of ES variations to traditional markets in monetary terms, but to also consider non-economic benefits including cultural and biodiversity values. The authors identified that the erroneous assumption that ES requires economic valuation was a barrier to the pursuit of ES research and policy applications.¹²³

Nevertheless, the ES concept has influenced significant efforts to establish methodologies for valuing natural capital and ecosystem services in monetary terms and such valuation can offer a

Management 107; M Ruckelshaus, et al. 'Notes from the field: lessons learned from using ecosystem service approaches to inform real-world decisions' (2015) 115 *Ecological Economics* 11.

¹¹⁸ F Villa, R Portela and L Onofri 'Assessing biophysical and economic dimensions of societal value: an example for water ecosystem services in Madagascar' in J Martin-Ortega et al. (eds) *Water Ecosystem Services: A Global Perspective* (Cambridge University Press 2015).

¹¹⁹ Maes et al. supra (n 4).

¹²⁰ TEEB supra (n 112).

¹²¹ 'Intergovernmental Platform on Biodiversity and Ecosystem Services' <www.ipbes.net/about-ipbes.html> accessed 3 May 2018.

¹²² RB Norgaard 'Ecosystem services: from eye-opening metaphor to complexity blinder' (2010) 69 *Ecological Economics* 1219.

¹²³ M Ruckelshaus supra (n 117).

more robust basis for policy. Research to capture the value of ecosystem services has led directly to attempts to account for their value in decision-making.¹²⁴ The monetization of ecosystem service values follows the predominant paradigm of Neoclassical economics within environmental economics. Within this paradigm, the value of ecosystem services is measured in terms of the welfare change associated with changes in ecosystem status in monetary units.¹²⁵ The dominant framework for monetary valuation of ecosystem services is that of Total Economic Value, which encompasses two categories: use values and non-use values, which are elaborated below.

Use values encompass three categories:¹²⁶

- *Direct-use value*, which is also known as the extractive, consumptive or structural use value, is mainly derived from goods that can be extracted, consumed or enjoyed directly. Examples of these goods include drinking water, fish and hydropower, as well as recreation activities.
- *Indirect-use value*, which mainly derives from the services that the environment provides, including regulation of river flows, flood control and water purification.
- *Option value*, which is the value attached to maintaining the possibility of obtaining benefits from ecosystem goods and services at a later date, including from ecosystem services that appear to have a low value now, but could have a much higher value in future because of new information or knowledge.

Non-use values are divided as follows:¹²⁷

- *Bequest value*, which is the value attached by individuals to the fact that future generations will also have access to the benefits from species and ecosystems (intergenerational equity concerns).
- *Altruist value*, which is attached by individuals to the fact that other people of the present generation have access to the benefits provided by species and ecosystems (intragenerational equity concerns).
- *Existence value*, which is related to the satisfaction that individuals derive from the mere knowledge that species and ecosystems continue to exist.

¹²⁴ K Turner, S Georgious and B Fisher, *Valuing ecosystem services: the case of multi-functional wetlands* (Earthscan 2008).

¹²⁵ Gómez-Baggethun et al. supra (n 10).

¹²⁶ Kumar supra (n 2).

¹²⁷ *ibid.*

While some early research attempted calculation of the absolute, global value of whole ecosystems, economic valuation is best applied not to an entire ecosystem but to an incremental change and within a specified policy context.¹²⁸ Research to quantify the marginal value, or cost or benefit of changes adding or removing ecosystem services is particularly relevant in policy and decision-making.¹²⁹ For example, in the water context, practitioners have observed that generic, global estimates of the economic value are not useful for guiding investment decisions, but more detailed data on the economic impact of specific actions can provide an evidence base for policy makers.¹³⁰ These marginal values can be aggregated in attempts to encompass the value of underlying natural capital.¹³¹

There remain multiple methodological challenges related to monetary valuation in natural capital accounting. Monetary valuation in economics is most often based on methodology of ‘adjusted market prices’, which uses market prices adjusted for any distortions. The application of this methodology is limited in the case of ES, where it may be relevant, for example, to some provisioning services. However, since most ecosystem services are better characterised as public goods and are not transacted in the market, they have no ‘market value’, and valuation for ES cannot be applied consistently with market valuation methods. The application of other methodologies to express the value of ES in monetary terms is at the leading edge of a wider, growing, body of work on the valuation of non-market costs and benefits.¹³² These include:

- ‘Production function methods’, which are based on an estimation of an ecological production function where the ecosystem service is modeled as an input to the production process and is valued through its effect on the output. This requires isolating and uncovering the value of ecosystem services from the perspective of their effect on some observed level of output, which depends on a complex and uncertain underlying scientific basis.¹³³

¹²⁸ *ibid.*

¹²⁹ Rieu-Clarke and Spray *supra* (n 40).

¹³⁰ D Whittington, C Sadoff and M Allaire, *The Economic Value of Moving Toward a More Water Secure World*, (Global Water Partnership Technical Committee Background Paper No. 18, 2013).

¹³¹ Costanza R, ‘Changes in the global value of ecosystem services’ (2014) 26 *Global Environmental Change* 152.

¹³² G Atkinson, I Bateman and S Mourato ‘Recent advances in the valuation of ecosystem services and biodiversity’ (2012) 28(1) *Oxford Review of Economic Policy* 22.

¹³³ EB Barbier ‘Valuing Ecosystem Services as Productive Inputs’ (2007) 22(49) *Economic Policy* 177; Atkinson, Bateman and Mourato *supra* (n 131).

- 'Revealed preference methods' which examine actual expenditures made on market goods related to ecosystem services. Here, market goods are used as proxies for ES, which may be relevant where an ES is a characteristic of a market good (for example, travel cost related to recreation). However, the applicability of this approach is limited where some values of ES are not represented in markets at all.¹³⁴
- 'Stated preference methods', which are based on surveys eliciting responses on willingness to pay, for a change in the environment (contingent valuation), or willingness to pay at different levels for different levels of ES at different prices (choice modelling). These methods can be applied to a wide range of ES, but represent the least accurate methodology because stated preferences may not represent actual behaviour, and survey participants may lack adequate understanding of ES to make informed responses.¹³⁵

Another limitation of monetary valuation techniques is a tendency to overlook the value of cultural services and the values for ecosystem services that are shared by different social groups, as opposed to the aggregation of individual values, and the way these values may change over time for different groups due to environmental, social, economic or technological change.¹³⁶ Sociocultural values encompass emotional, affective and symbolic views of the environment that in most cases cannot be captured in any meaningful way by monetary valuation.¹³⁷

The need for and validity of monetary assessments of ecosystem services values has been challenged, particularly from ecological economics perspectives.¹³⁸ The concept of valuation can also encompass stakeholder perceptions about ES in decision-making without expressing values in monetary terms.¹³⁹ Alternative indicators that do not rely on monetary values have also been

¹³⁴ Atkinson, Bateman and Mourato supra (n 131).

¹³⁵ IJ Bateman, A Munro and GL Poe 'Asymmetric Dominance Effects in Choice Experiments and Contingent Valuation' (2008) 84 *Land Economics* 115.

¹³⁶ Kenter et al. 'What are shared and social values of ecosystems?' *Ecological Economics*, 111 (2015) 86; MS Reed et al. 'A place-based approach to payments for ecosystem services' (2017) 43 *Global Environmental Change* 92.

¹³⁷ KMA Chan, T Satterfield and J Goldstein 'Rethinking Ecosystem Services to Better Address and Navigate Cultural Values (2012) 74 *Ecological Economics* 8.

¹³⁸ JL Proops 'Ecological economics: rationale and problem areas' (1989) 1(1) *Ecological Economics* 59; J Martinez-Alier, G Munda and J O'Neill 'Weak comparability of values as a foundation for ecological economics' (1998) 26(3) *Ecological Economics* 277; D Azqueta and G Delaca'mara 'Ethics, economics and environmental management' (2006) 56(4) *Ecological Economics* 524; JH Spangenberg and J Settele 'Precisely incorrect? Monetising the value of ecosystem services' (2010) 7(3) *Ecological Complexity* 327.

¹³⁹ P Lamarque et al. 'Stakeholder perceptions of grassland ecosystem services in relation to knowledge on soil fertility and biodiversity' (2011) 11(4) *Regional Environmental Change* 791.

suggested and applied, such as more holistic measures of how ecosystem services relate to wellbeing. Recent research has made progress in better integrating social perspectives and cultural valuation techniques into ES assessments without stating these values in monetary terms.¹⁴⁰ Deliberative and participatory approaches to environmental valuation are advocated as a way to represent multiple dimensions of ES values within decision-making.¹⁴¹ Ecological values can also be quantified in non-monetary terms, for example, through biophysical measurements of material flows, energy or land cover.¹⁴² Another innovative technique is the ‘capability approach’, which considers measures of the capacity of humans to achieve wellbeing, can also be applied in relation to ecosystem services.¹⁴³

The high costs of assessment can also represent an obstacle to monetary and non-monetary valuation studies.¹⁴⁴ Furthermore, estimating the value of ecosystem services comes at the end of an evaluation sequence that builds on the assessment of ecosystem provision of multiple ecosystems services,¹⁴⁵ which has its own challenges as described in the previous section.

TEEB has driven efforts towards national and international systems of measurement for natural capital, arguing that these are just as critical to economic development as traditional monitoring and reporting of economic and human capital.¹⁴⁶ The United Kingdom National Ecosystem Assessment represents a leading initiative in national capital accounting to assess aggregate trends in ecosystem services, including in monetary terms.¹⁴⁷ The Intergovernmental Platform on Biodiversity and Ecosystem Services framework has also taken steps towards

¹⁴⁰ Chan, Satterfield and Goldstein supra (n 137).

¹⁴¹ J Bebbington, J Brown, and B Frame ‘Accounting technologies and sustainability assessment models’ (2007) 61 *Ecological Economics* 224; G Wegner and U Pascual ‘Cost–benefit analysis in the context of ecosystem services for human well-being: a multidisciplinary critique’ (2011) 21 *Global Environmental Change* 492; S Parks and J Gowdy ‘What have economists learned about valuing nature? A review essay’ (2013) 3 *Ecosystem Services* 1; UKNEA supra (n 31).

¹⁴² E Gomez-Baggethun and B Martin-Lopez, ‘Ecological economics perspectives on ecosystem services valuation’ in J Martínez-Alier and R Muradian (eds) *Handbook of Ecological Economics* (Edward Elgar Publishing 2015).

¹⁴³ Y Polishchuk and F Rauschmayer ‘Beyond “benefits”? Looking at ecosystem services through the capability approach’ (2012) 81 *Ecological Economics* 103.

¹⁴⁴ Russi et al. supra (n 26).

¹⁴⁵ TEEB supra (n 112).

¹⁴⁶ *ibid.*

¹⁴⁷ UKNEA supra (n 31); Atkinson, Bateman and Mourato supra (n 131).

acknowledging a greater diversity of values in the relationship between people and nature and to encourage pluralism in valuation methodologies.¹⁴⁸

The ‘System of Economic Environmental Accounting’ (SEEA) is a leading initiative developed by the United Nations Statistics Division to develop statistical methods for natural capital accounting. It is a direct response to Agenda 21, which proposed national systems of economic and environmental accounting for all countries in order to support integrated decision-making. The SEEA brings together economic and environmental indicators into a common framework to measure the condition of the environment, the contribution of the environment to the economy and the impact of the economy on the environment. It contains an internationally agreed set of standard concepts, definitions, classifications, accounting rules and tables to produce internationally comparable statistics.¹⁴⁹ Critiques related to the ES concept and valuation efforts are further discussed in sections 2.5.

2.4.3 Policy Entry Points for Ecosystem Services

Mismanagement of ecosystems in most cases cannot be attributed to lack of knowledge about ecosystems or ecosystem services (although knowledge gaps certainly remain, as highlighted above). Rather, this knowledge has been inadequately represented in mainstream legal, economic and governance institutions and decision-making processes.¹⁵⁰ The result has been a failure to account for the extent to which the modification of ecosystems and exploitation of natural resources has undermined the ecosystem services on which economies depend.¹⁵¹ ES-based approaches can include a wide range of policy interventions to overcome undervaluation of ecosystem services. Some tools for protecting ecosystem services are novel, but in most cases ES-based approaches involve adapting existing laws, policies and economic tools to specifically reflect ES values. Some examples of policy entry points for ES-based approaches are summarized here.

ES can help strengthen the case for protected areas and other biodiversity conservation measures. For example, one study examined the financial costs and benefits of restoring marine, inland and coastal ecosystems, and concluded that in most cases the large value of ecosystem

¹⁴⁸ KMA Chan and T Satterfield ‘Managing cultural ecosystem services for sustainability’ in M Potschin et al. (eds) *Routledge Handbook of Ecosystem Services* (Routledge 2016).

¹⁴⁹ ‘System of Economic Environmental Accounting’ (United Nations Statistics Division) <<https://seea.un.org>> accessed 2 April 2018.

¹⁵⁰ JB Ruhl, SE Kraft and CL Lant, *The law and policy of ecosystem services* (Island Press 2007); Daily supra (n 22); Kumar supra (n 2).

¹⁵¹ Kumar supra (n 2).

services provides a net economic benefit.¹⁵² Other studies have demonstrated the range of benefits to society associated with the protection of habitat for species at risk.¹⁵³ Similarly, research indicates that conserving critical sites for biodiversity yields disproportionate benefits to human societies.¹⁵⁴ ES is well suited as a tool to integrate conservation and sustainable economic development, by illustrating benefits and trade-offs across society.¹⁵⁵ One study used an ES approach to demonstrate that accounting for sustainable development needs within conservation planning required only a small increase in area-based conservation targets (from 17 to 20 percent), in order to meet the same levels of biodiversity protection and ES provision, while decreasing conflict with agriculture, commercial forestry and landowners.¹⁵⁶ ES can also be used in setting conservation priorities, such as using maximization of ES as an indicator to guide the best use of public funds in acquiring land for conservation.¹⁵⁷ However, as discussed in the next section, there are concerns that prioritizing ES in conservation efforts can actually hinder biodiversity protection by focusing on anthropocentric considerations.¹⁵⁸

Perhaps the even greater potential for ES-based approaches to improve the status of ecosystems lies in their relevance to sectors that have not traditionally been concerned with protecting nature or biodiversity. One review examined applications of the InVEST model in twenty pilot studies, and found it to be a useful tool in mapping the links between ecosystems, ecosystem services and policy decisions in contexts such as urban planning, climate change mitigation and drinking water protection.¹⁵⁹ For example, research has demonstrated how ES may be applied to identify and prioritize climate change adaptation options.¹⁶⁰ It can also inform strategies to sustain

¹⁵² RS de Groot et al. 'Benefits of Investing in Ecosystem Restoration' (2013) 8 *Conservation Biology* 1215.

¹⁵³ NK Bhagabati et al. 'Ecosystem services reinforce Sumatran tiger conservation in land use plans' (2014) 169 *Biological Conservation* 147.

¹⁵⁴ F Larsen, WR Turner and TM Brook 'Conserving Critical Sites for Biodiversity Provides Disproportionate Benefits to People' (2012) 7(5) *PLoS ONE*: e36971.

¹⁵⁵ TEEB supra (n 112).

¹⁵⁶ E Di Minin et al. 'Integrating biodiversity, ecosystem services and socio-economic data to identify priority areas and landowners for conservation actions at the national scale' (2017) 206 *Biological Conservation* 56.

¹⁵⁷ K Kovacs, et al. 'Evaluating the return in ecosystem services from investment in public land acquisitions' (2013) 8 *PLOS ONE* e62202

¹⁵⁸ M Schröter et al. 'Ecosystem services as a contested concept: a synthesis of critique and counter-arguments' (2014) 7(6) *Conservation Letters* 12091.

¹⁵⁹ M. Ruckelshaus supra (n 117).

¹⁶⁰ SJ Capon and SE Bunn 'Assessing climate change risks and prioritizing adaptation options using a water ecosystem services-based approach' in J Martin-Ortega et al. (eds) *Water Ecosystem Services: A Global Perspective* (Cambridge University Press 2015).

agricultural growth while maintaining the highest level of other ecosystem services possible.¹⁶¹ ES has been applied in regulatory decision analysis, where ES valuation is used to inform impact assessments and cost-benefit analysis of proposed legislation and policies. ES can also be considered in environmental assessments, informing approval decisions and mitigation measures that are imposed on commercial and industrial development.¹⁶² ES may also provide a focus for command-and-control type regulations that target the protection of certain services.¹⁶³

Research has demonstrated how ES may be applied in IWRM, for example, by mapping multiple ecosystem services in a basin and demonstrating trade-offs. One study concluded that the ES concept was useful in broadening the concept of environmental benefits, and relating this to stakeholder preferences, which represented “a significant leap forward compared to current practice, where the volume of water held for the environment has been used as the sole indicator of environmental benefits.”¹⁶⁴ Another study mapped water purification services delivered by freshwater ecosystems in a case study basin, and used a model to demonstrate the potential results of investments to restore wetlands on nitrogen mitigation efforts across Europe.¹⁶⁵ Researchers have also advocated for applying ES in the development of River Basin Management Plans under the EU Water Framework Directive.¹⁶⁶

ES can be applied in land-use planning.¹⁶⁷ Natural or ‘green’ infrastructure is increasingly being used to supplement traditional infrastructure.¹⁶⁸ For example, the use of wetlands for waste water and storm water drainage, green spaces to capture rain, coastal or riparian vegetation to provide a flood barrier, green rooftops to provide localized cooling and green space, and watershed protection to improve the quality and quantity of drinking water before it reaches municipal

¹⁶¹ M Salman and A Martinez ‘Water for agriculture and energy: the African quest under the lenses of an ecosystem services-based approach’ in J Martin-Ortega et al. (eds) *Water Ecosystem Services: A Global Perspective* (Cambridge University Press 2015).

¹⁶² *Completing and Using Ecosystem Service Assessment for Decision-Making: An Interdisciplinary Toolkit for Managers and Analysts* (Value of Nature to Canadians Study Taskforce 2017).

¹⁶³ Ruhl, Kraft and Lant supra (n 154).

¹⁶⁴ Liu et al. supra (n 69) 101.

¹⁶⁵ Maes et al. supra (n 4).

¹⁶⁶ B Grizzetti et al. ‘Assessing water ecosystem services for water resource management’ (2016) 61 *Environmental Science & Policy* 194.

¹⁶⁷ Value of Nature to Canadians Study Taskforce supra (n 166); Guerry et al. supra (n 113); H Kang, H Chang and MG Chung ‘Rapid land use change impacts on coastal ecosystem services: a South Korean case study’ in J Martin-Ortega et al. (eds) *Water Ecosystem Services: A Global Perspective* (Cambridge University Press 2015).

¹⁶⁸ Kumar supra (n 2).

treatment facilities.¹⁶⁹ From a public health perspective, some research has found strong evidence linking biodiversity and exposure to nature with human health, and explored the positive implications of ‘greening’ urban environments.¹⁷⁰ Similarly, ES may be considered in natural disaster mitigation strategies. Research has shown that the conservation of coastal habitats could significantly reduce exposure of people and property to storms, sea level rise, and other natural hazards.¹⁷¹ In the United States, for example, one of the main components of the Rebuilding Strategy following Hurricane Sandy was the restoration of natural coastal infrastructure such as reefs, marshes, dunes and mangroves that help protect coastal areas from storms.¹⁷²

ES valuation has contributed to environmental damages assessment.¹⁷³ Environmental standards and liability regimes may be reformed or applied differently in light of new knowledge of ES values. For example, legislative liability regimes for sectors such as mining and oil and gas have been amended in several countries to provide explicitly for accounting for harm to ecosystems.¹⁷⁴ An ES approach to calculating damages was applied in the high profile case of the Deepwater Horizon spill in the Gulf of Mexico.¹⁷⁵ Even in the absence of legislation, the ES concept may inform courts’ determination of damages and understanding of duties in resolving environmental disputes.¹⁷⁶ ES may also inform the interpretation of property rights and the evolution of common law doctrines such as private and public nuisance and the public trust doctrine.¹⁷⁷ Research has also explored how the ES concept might inform the principles of equity and benefit sharing in international water law.¹⁷⁸

¹⁶⁹ K Tzoulas et al. ‘Promoting ecosystem and human health in urban areas using green infrastructure: a literature review’ (2007) 81 *Landscapes and Urban Planning* 167.

¹⁷⁰ PA Sandifer, AE Sutton-Grier and BP Ward ‘Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation’ (2015) 12 *Ecosystem Services* 1.

¹⁷¹ KK Arkema ‘Coastal habitats shield people and property from sea- level rise and storms’ (2013) 3 *Nature Climate Change* 913.

¹⁷² *Hurricane Sandy Rebuilding Strategy* (Hurricane Sandy Rebuilding Task Force, Department of Housing and Urban Development 2013).

¹⁷³ Ruhl, Kraft and Lant supra (n 154).

¹⁷⁴ Value of Nature to Canadians Study Taskforce supra (n 166).

¹⁷⁵ *An Ecosystem Services Approach to Assessing the Impacts of the Deepwater Horizon Oil Spill in the Gulf of Mexico* (National Academies Press 2013)

¹⁷⁶ R Pasténa, M Olszynskic and M Hantke-Domas ‘Does slow and steady win the race? Ecosystem services in Canadian and Chilean environmental law’ (2018) 29(B) *Ecosystem Services* 240.

¹⁷⁷ *ibid.*

¹⁷⁸ Rieu-Clarke and Spray supra (n 40).

ES may be used in the design of economic tools such as incentive payments, charging for access and use of ES, voluntary eco-labelling and certification, and market-based trading of ES credits, conservation offsets and water-quality offsets.¹⁷⁹ In this category, ‘payments for ecosystem services’ is an umbrella term that has been used to describe incentive-based approaches to secure the provision of ecosystem services. Some interpretations of the ES concept are based on the assumption that payment for ES will ensure their provision.¹⁸⁰ The strengths and limitations of PES in this regard and the role of legal frameworks for PES will be discussed in Chapter 3 and the case studies that follow. However, as illustrated above, the ES concept can contribute to making ecosystems more visible through many nonmarket policy approaches. Furthermore, the adoption of ES in broader policy provides important context for the application of PES schemes, which do not occur in a vacuum, but within legal, institutional and economic structures.

2.5 Critique of the Contribution of Ecosystem Services to Environmental Policy

2.5.1 The Anthropocentric Focus of Ecosystem Services

A key characteristic that distinguishes ES-based approaches is an anthropocentric focus on how the status of ecosystems affects human wellbeing.¹⁸¹ This re-orientates the consideration of biophysical processes in terms of the benefits nature delivers to humans and what roles humans play in that delivery. It also requires the integration of natural and social sciences, and encompasses non-scientific stakeholder perceptions of wellbeing. To some, the incorporation of normative values within ES makes it less favourable as a basis for policy than objective ecosystem science.¹⁸² However, total freedom from value judgements is impossible even for ‘pure’ science embedded in sociocultural contexts. By more fully elaborating and making explicit the links between ecosystems and human interests, ES can illuminate a broader range of interests and over a broader time and spatial scale, and contributes to transparency in how values are taken into account. This approach is used to establish the legitimacy of decisions based on the value of ecosystem services to society.¹⁸³

¹⁷⁹ Kumar supra (n 2); Ruhl, Kraft and Lant supra (n 154).

¹⁸⁰ Schröter et al. supra (n 162); KH Redford and WM Adams ‘Payment for ecosystem services and the challenge of saving nature’ (2009) 23 *Conservation Biology* 785.

¹⁸¹ J Martin-Ortega et al. ‘What defines ecosystem services-based approaches?’ in J Martin-Ortega et al. (eds) *Water Ecosystem Services: A Global Perspective* (Cambridge University Press 2015).

¹⁸² Goble supra (n 98).

¹⁸³ Schröter et al. supra (n 162).

However, ES has been contested on the basis that it undermines the ethical reasons to protect biodiversity because of its inherent value.¹⁸⁴ Some authors also warn that the economic production metaphor of ES could promote an exploitative human–nature relationship.¹⁸⁵ These critiques are rooted in deeper debates of environmental ethics, dealing with the question of whether human beings actions towards nature should be guided by anthropocentric considerations of the instrumental values of nature, or by biocentric reasoning that respects the intrinsic values of nature.¹⁸⁶ These differing philosophies have been especially polarizing in conservation, with literature distinguishing between “nature protectionists” and “social conservationists”.¹⁸⁷ The ES concept is not meant to replace biocentric values, but adds a broad array of anthropocentric values, and these are not mutually exclusive.¹⁸⁸ While some have argued that ES precludes consideration of the intrinsic value of species,¹⁸⁹ the ES framework does in fact encapsulate non-material, intangible values. It has been suggested that stronger acknowledgment of existence values within the cultural services domain could bring different worldviews together.¹⁹⁰ Also, while recognizing the instrumental values of ecosystem services, the ES framework also fundamentally recognizes the dependence of humans on the earth’s life-support system.¹⁹¹

The anthropocentric focus of ES can also be situated in historical shifts in approaches to biodiversity conservation. One review distinguishes roughly four phases over the past fifty years: the idea of “nature for itself” and a focus on wilderness protection dominated in the 1970s; this shifted in the 1990s to “nature despite people”, with a focus on mitigating extinction and threats to species and habitats; in the early 2000s, the concept of “nature for people” became prominent, driven in part by the interest in ES; this evolved into a perspective of “people and nature”, observed

¹⁸⁴ *ibid.*

¹⁸⁵ CM Raymond et al. ‘Ecosystem services and beyond: using multiple metaphors to understand human–environment relationships’ (2013) 63 *Bioscience* 536; J Fairhead, M Leach and I Scoones ‘Green Grabbing: a new appropriation of nature?’ (2012) 39 *Journal of Peasant Studies* 237; Goble *supra* (n 98).

¹⁸⁶ K Jax et al. ‘Ecosystem services and ethics’ (2013) 93 *Ecological Economics* 260; J Justus et al. ‘Buying into conservation: intrinsic versus instrumental value’ (2009) 24 *Trends in Ecology & Evolution* 187.

¹⁸⁷ TR Miller, BA Minter, and LC Malan ‘The new conservation debate: the view from practical ethics’ (2011) 144 *Biological Conservation* 948.

¹⁸⁸ Chan, Satterfield and Goldstein *supra* (n 103).

¹⁸⁹ DJ McCauley ‘Selling out on nature’ (2006) 443 *Nature* 27; M Sagoff ‘On the economic value of ecosystem services’ (2008) 17 *Environmental Values* 239; Redford and Adams *supra* (n 165).

¹⁹⁰ Chan, Satterfield and Goldstein *supra* (n 99); B Reyers et al. ‘Finding common ground for biodiversity and ecosystem services’ (2012) 62 *BioScience* 503.

¹⁹¹ C Borgström Hansson and M Wackernagel ‘Rediscovering place and accounting space: how to re-embed the human economy’ (1999) 29 *Ecological Economics* 203; CM Raymond et al. *supra* (n 174).

in the CBD's *Strategic Plan for Biodiversity 2011-2020*, that considers socio-ecological systems, integrating knowledge of ES and focusing on themes such as resilience and adaptability.¹⁹² The authors argue that ultimately, the differences in these perspectives are not as stark as they appear: they all encompass human aspirations for the kind of environment they want to live in and leave to descendants.¹⁹³ In any case, it is inescapable that human motivations drive decisions impacting biodiversity. A holistic perspective that situates humans within nature also brings the anthropocentric/ biocentric debate full circle, because ecological and human interests become inextricable.

Pragmatically, ES provides a powerful rationale to unite a greater range of stakeholders.¹⁹⁴ There is more likelihood for consensus on ecosystem protection when it is framed in terms of avoiding high costs of polluted water, flooding, diminished crop productivity and other tangible "service" disruptions (particularly where these are immediate, local and visible).¹⁹⁵ Furthermore, ecosystem values will not curb ecosystem degradation in the absence of ways to systemically integrate values into decision-making structures. Considering humans and nature together is likely to have better policy traction,¹⁹⁶ which is critical in the current global context where most ecosystems have been altered by human activities.¹⁹⁷ The anthropocentric focus of ES brings the environment into social and economic policy realms in a more meaningful way, placing greater emphasis on the environment within the sustainable development agenda. ES has successfully changed the discourse towards wider recognition that environmental protection does not necessarily mean negative trade-offs with development.¹⁹⁸

Finally, it is misleading to juxtapose ES against ethical positions, because environmental ethics also encompasses anthropocentric values.¹⁹⁹ In order to make progress in environmental protection and conservation there must be acceptance of ethical pluralism, especially given the

¹⁹² G Mace 'Whose conservation?' (2014) 345(6204) *Science* 1558; *Strategic Plan for Biodiversity 2011–2020* (Convention on Biological Diversity 2010).

¹⁹³ *ibid.*

¹⁹⁴ Miller, Minter and Malan *supra* (n 191).

¹⁹⁵ J Salzman, BH Thompson & GC Daily 'Protecting Ecosystem Services: Science, Economics, and Law' (2001) 20 *Stanford Environmental Law Journal* 309.

¹⁹⁶ Mace *supra* (n 196).

¹⁹⁷ M Skroch and L López-Hoffman 'Saving nature under the big tent of ecosystem services: a response to Adams and Redford' (2010) 24 *Conservation Biology* 325.

¹⁹⁸ de Groot et al. *supra* (n 108).

¹⁹⁹ Jax et al. (n 171); JB Callicott, LB Crowder, and KG Mumford 'Current normative concepts in conservation' (1999) 13 *Conservation Biology* 22.

reality of acute human needs in the developing world. Some authors suggest that landscape-level approaches that consider ES, including PES schemes, have the potential to accommodate different values and achieve a convergence of interests, without the need to resolve differing underlying philosophies.²⁰⁰

2.5.2 Ecosystem Services and Biodiversity

Another critique related to ES and biodiversity questions how well ES-based approaches align with biodiversity protection in practice. There is concern that attention and resources could be diverted away from biodiversity protection if conservation goals are replaced with more narrowly focussed goals to protect human interests in ES.²⁰¹ On the contrary, there is evidence that current ES-based approaches have led to broader biodiversity conservation perspectives and practices, effectively expanding the realm of conservation, rather than narrowing the focus of conservation within its traditional realm.²⁰² For example, international agreements such as REDD+ and the CBD's 2020 biodiversity targets expand biodiversity protection into adjacent policy areas, and comprise the principle that biodiversity can be, directly or indirectly, safeguarded by managing, restoring or enhancing ES provision.²⁰³

Biodiversity is conceptually represented in the ES framework, most significantly in the categories of cultural, regulating and maintenance/supporting services.²⁰⁴ However, some have contended that ES is essentially a 'bet against technology', as ecosystem protection will only remain relevant as long as services cannot be provided by a substitute.²⁰⁵ In response, a global-level analysis concluded that while "technological innovation may temporarily mask a reduction [in ES]", in the long run... it is unlikely to compensate for massive depletion of such fundamental resources as productive land, fisheries, old-growth forests and biodiversity".²⁰⁶ Critiques of ES also question the scientific basis for linking biodiversity and ES, with some arguing that there is inconclusive

²⁰⁰ Miller, Minter and Malan supra (n 191).

²⁰¹ B Ridder 'Questioning the ecosystem services argument for biodiversity conservation' (2008) 17 *Biodiversity Conservation* 781; B Vira and WM Adams 'Ecosystem services and conservation strategy: beware the silver bullet' (2009) 2 *Conservation Letters* 158.

²⁰² P Balvanera et al. 'Conserving biodiversity and ecosystem services' (2001) 291 *Science* 2047; PR Armsworth et al. 'Ecosystem-service science and the way forward for conservation' (2007) 21 *Conservation Biology* 1383.

²⁰³ Schröter et al. supra (n 162).

²⁰⁴ GM Mace, K Norris and AH Fitter 'Biodiversity and ecosystem services: a multilayered relationship' (2012) 27 *Trends in Ecology and Evolution* 19.

²⁰⁵ McCauley supra (n 193); Goble supra (n 98).

²⁰⁶ Daily supra (n 22).

evidence of a “win-win” scenario,²⁰⁷ and others concluding that there is sufficient evidence that biodiversity strongly correlates with certain provisioning and regulating services.²⁰⁸ There is also a growing body of evidence that high levels of biodiversity are necessary to maintain multiple ES at multiple locations and over time.²⁰⁹ However, more knowledge is required about how, exactly, biodiversity underpins ES.²¹⁰

Some research questions the benefits for biodiversity if some of the most highly valued ecosystem services depend, at least directly, on a relatively narrow fraction of biodiversity.²¹¹ There is reason for concern where ES is itemized, rather than considered holistically, and a specific ES is heavily prioritized over others. For example, in the context of increasing interest in forest carbon sequestration as a climate change mitigation strategy, some projects have encouraged the plantation of fast-growing tree species that fix high amounts of carbon, but interfere with overall species richness and density, and disrupt water flows. At another extreme, if a watershed is managed to maximize the quantity of downstream water flows, this could mean minimizing forest species’ water consumption by limiting species types and reducing biomass, conflicting with both biodiversity and carbon sequestration values.²¹² These examples echo the same concerns about trade-offs caused by the intensive focus on provisioning services, demonstrating that even within ES-based approaches, a narrow focus is problematic. There is also a risk that policy interventions for land and water management, such as PES, could be counterproductive if they are designed based on an incomplete or flawed understanding of what practices will result in the desired services.²¹³

Other research has shown that ES provision and biodiversity protection are a good match when it comes to area-based assessments and spatial conservation prioritization. For example, model-based research has examined trade-offs and synergies between carbon storage, provision of freshwater services and biodiversity when selecting sites for conservation. This revealed that where each of these objectives was prioritized independently, there was little overlap between the

²⁰⁷ Norgaard supra (n 122).

²⁰⁸ BJ Cardinale et al. ‘Biodiversity loss and its impact on humanity’ (2012) 486 *Nature* 59.

²⁰⁹ F Isbell et al. ‘High plant diversity is needed to maintain ecosystem services’ (2011) 477 *Nature* 199.

²¹⁰ Larsen, Turner and Brook supra (n 158).

²¹¹ Martin-Ortega, Ferrier and Gordon supra (n 12).

²¹² N Kosoy and E Corbera ‘Payments for ecosystem services as commodity fetishism’ (2010) 69 *Ecological Economics* 1228.

²¹³ Martin-Ortega supra (n 185).

priority sites for each one (i.e., the best site for carbon storage was not also the best for water or biodiversity, and vice versa). However, there was a promising scope for aligning these objectives in the selection of sites that had very high benefits in all three areas.²¹⁴ Other research found that critical sites for biodiversity tended to support disproportionately high ES in terms of carbon storage, cultural services, and freshwater services. This correlation could be attributed to multiple factors. With respect to freshwater ES: priority sites for biodiversity tended to be forested (a land cover of particular importance to water quality), have higher precipitation (which supports both biodiversity and water quantity for human use), be at higher elevations (thus, with greater downstream area), and be situated in areas with greater threat of human encroachment (and thus in proximity to human settlements that benefit from water supply).²¹⁵

Understanding how natural capital produces ecosystem services and across what spatial and temporal scales is also important to informing management interventions to secure ecosystem services. Natural capital encompasses underlying ecosystems and biodiversity that are necessary to produce ES, and attempts to implement ES-based approaches are unlikely to be successful if they target specific ecosystem services without explicit reference to natural capital stocks.²¹⁶

2.5.3 The Economic Framing of Ecosystem Services

The ES concept has also been contested because it entails economic framing, and ES assessments often involve economic valuation.²¹⁷ To some, this represents ‘selling out on nature’ and there are concerns that it opens the door to commodification of nature.²¹⁸ As discussed in section 2.4, ES assessments do not necessarily involve valuation and valuation does not necessarily involve monetization. Furthermore, monetization does not necessarily lead to commodification. The potential benefits and risks of market-based approaches and commodification of ES will be more fully explored in Chapter 3, as it relates to PES, but the broader issues associated with ES valuation are reviewed here.

²¹⁴ FW Larsen, MC Londono-Murcia, and WR Turner ‘Global priorities for conservation of threatened species, carbon storage, and freshwater services: scope for synergy?’ (2011) 4 *Conservation Letters* 355.

²¹⁵ Larsen, Turner and Brook *supra* (n 158).

²¹⁶ Maseyk *supra* (n 7).

²¹⁷ Schröter et al. *supra* (n 162).

²¹⁸ McCauley *supra* (n 193); Sagoff *supra* (n 193); E Turnhout ‘Rethinking biodiversity: from goods and services to “living with”’ (2013) 6 *Conservation Letters* 154.

The rationale for the economic framing and valuation of ES is that it provides additional information in decision-making processes. The identification of relevant ecosystem services, the qualitative description of ES values, and/or the quantitative valuation of ES, allows ecosystems to be better represented in a cost-benefit analysis. Economic considerations based on monetary values of other goods and services are commonly part of decision-making, but typically reflect only a very narrow subset of ecosystem values, such as provisioning services for which there are markets. Valuation of ES can reveal the much higher value of the broader set of underlying ecosystem services and facilitate their consideration in existing decision-making processes.²¹⁹ As discussed above, the importance of regulatory and maintenance/ supporting services to human interests is most apparent over longer time scales. Similarly, while there are immediate economic benefits of protecting some ES, other economic impacts may be experienced over longer terms. ES analysis does not guarantee changes in the prioritization of short-term interests over long-term interests, but it can provide more comprehensive information for consideration, and to support the design of policy interventions.

There is a risk that assigning monetary values to ES will reduce its consideration to only monetary terms, masking the complexity of human-nature relationships.²²⁰ Where monetary values of a specific ES are higher than others, this can also exacerbate the problems associated with the prioritization of a single ES over others. A holistic approach to valuing bundles of multiple ES is one way to overcome a reductionist approach. Furthermore, ES valuation is utilized within existing legal and policy frameworks, where decisions are not based solely on monetary values. ES monetization allows ES to be considered in a broader realm of decision-making, but does not replace other processes or rationales for protecting ecosystems. However, it is also argued that more radical reforms to underlying political and economic structures are needed to concentrate on the public good character of ES.²²¹ Some analysis suggests that applying ES without changes to the institutional setup and broader sociopolitical processes would have potentially counterproductive effects in the long term for biodiversity conservation and equity of access to ES benefits.²²²

This relates to critiques of ES that are grounded in opposition to a market-based economic

²¹⁹ Kumar (n 2).

²²⁰ Norgaard supra (n 122); Kosoy and Corbera supra (n 216).

²²¹ Kosoy and Corbera supra (n 216).

²²² E Gómez-Baggethun and M Ruiz-Pérez 'Economic valuation and the commodification of ecosystem services' (2011) 35(5) *Progress in Physical Geography* 613.

system based on neoliberal capitalism.²²³ Neoliberal economics is primarily concerned with the goal of efficiency and the maximization of monetary value, and posits this can be achieved by integrating ES into the market framework. It is also argued that this theory is not well suited to a context of ecological thresholds, and where ecosystem services are essential to human welfare.²²⁴ The ES concept itself does not presuppose a neoliberal perspective, and application of the ES concept towards neoliberal goals is a function of that particular economic discipline. Ecological economics, for example, provides an alternate perspective that posits economic institutions should be adapted within ecological systems, towards achieving the highest possible quality of life compatible with the conservation of resilient, healthy ecosystems. Economics broadly is frequently defined as the study of the allocation of limited, or scarce, resources among alternative, competing ends.²²⁵ The question of how ecosystems should be managed to generate a balance of ecosystem services can be considered a fundamental question of economics. The concept of ES can be extremely valuable in this analysis, and should not be disregarded due to disagreements with a particular economic perspective.²²⁶

2.5.4 The Gap between the Ecosystem Services Concept and Implementation

A final group of critiques relate to the gap between the conceptualization and endorsement of ES in theory and the actual use of ES-based approaches in practice.²²⁷ The valuation of ES in itself has not contributed as significantly as some researchers had hoped to the management of ecosystems.²²⁸ This can be partially attributed to incomplete science, inconsistent methods of application, and insufficient funding to fully realize the potential of the ES framework.²²⁹ However, it should not be taken for granted that improved assessment and valuation of ES will lead directly to better management. There is an implicit assumption in ES discourse that unsustainable management is the result of lack of knowledge about ES, which neglects the reality that society is often willing to act knowingly contrary to scientific assessments or without full knowledge.²³⁰

²²³ B Büscher et al. 'Towards a Synthesized Critique of Neoliberal Biodiversity Conservation' (2012) 23(2) *Capitalism Nature Socialism* 4.

²²⁴ J Farley 'Ecosystem services: The economics debate' (2012) 1 *Ecosystem Services* 40.

²²⁵ *ibid*, 41.

²²⁶ Farley *supra* (n 228).

²²⁷ Martin-Ortega, Ferrier and Gordon *supra* (n 8); Cook and Spray *supra* (n 68); Bull et al. *supra* (n 10).

²²⁸ S Liu et al. 'Valuing ecosystem services theory, practice, and the need for a transdisciplinary synthesis' (2010) 1185 *Ann. N.Y. Acad. Sci* 54.

²²⁹ Bull et al. *supra* (n 10); Gómez-Baggethun and Ruiz-Pérez *supra* (n 206).

²³⁰ Cook and Spray *supra* (n 68).

Factors such as political feasibility, self-interest, general inertia and resistance to new ideas, and legal and institutional frameworks also shape decisions.

The goal of socio-ecological integration has also proved difficult or impractical in practice, given systemic challenges to successful interdisciplinary collaboration and cross-sectoral environmental policy.²³¹ Despite these challenges, some researchers conclude that ES has successfully fostered interdisciplinary research and made advancements towards the goal of integration.²³² The emphasis of ES on the positive relationship between healthy ecosystems and human wellbeing is seen as an advantage in initiating collaboration across sectors.²³³ However, it has also been observed that ES has become a ‘catch-all’ phrase that is easy to endorse on the surface, but does not resolve underlying competing interests.²³⁴ The ES concept has been criticized as being too optimistic by implying that all outcomes of ecosystem processes are necessarily good for humans or that ecosystem protection is always a win-win across society.²³⁵ There is a risk that this can lead to ‘fake consensus’ among stakeholders that is devoid of specific meaning and hinders implementation to specific cases.²³⁶

The concepts of sustainability and IWRM have been similarly criticized for being too vague and aspirational in seeking to balance many competing interests, without confronting the critical question of how, exactly, they should be balanced.²³⁷ The possibility for multiple interpretations makes these concepts susceptible to what is seen as ‘hijacking’ by economic, humanitarian, or environmentalist interests.²³⁸ While the ES concept is vague and aspirational in promoting the benefits to humans from ecosystems, the ES framework and assessment and valuation methodologies do make a more concrete contribution. By linking social and economic benefits with ecosystem science, ES reveals the capacity and limitations of ecosystems to achieve those benefits. This situates the sustainability debate and the balancing of trade-offs within the bounds of ecological thresholds.

²³¹ Cook and Spray supra (n 68); Bull et al. supra (n 10).

²³² Schröter et al. supra (n 162); Bull et al. supra (n 10).

²³³ Schröter et al. supra (n 162).

²³⁴ Martin-Ortega et al. supra (n 185).

²³⁵ McCauley supra (n 193).

²³⁶ AM Nahlik et al. ‘Where is the consensus? A proposed foundation for moving ecosystem service concepts into practice’ (2012) 77 *Ecological Economics* 27.

²³⁷ Cook and Spray supra (n 68).

²³⁸ Cook and Spray supra (n 68); Biswas supra (n 74).

The critical challenge in implementing ES remains at the stage of confronting trade-offs between stakeholders and making a decision towards one management option or another.²³⁹ While ES methodologies may be equipped to reveal the implications of different management options, they are not suited on their own to addressing the political and ethical issues inherent in management decisions. In order to affect management, ES approaches need to go beyond generating knowledge and develop tools and processes to insert ES within policy and governance structures.²⁴⁰ The examples highlighted in section 2.4.3 show some promising advancements in this regard. The determination of what constitutes desirable ends in managing ecosystems depends on the governance frameworks within which ES knowledge is applied.²⁴¹ Some research has also explored the potential for ES to shape new institutional frameworks, arguing that ES can facilitate a shift from centralized and sectoral approaches towards nested, integrated approaches.²⁴² ES cannot 'solve' socio-ecological problems or broader governance challenges, but it has made positive contributions towards these endeavours.²⁴³

2.6 Conclusions

The ES concept has widely influenced environmental and sustainable development policy, in particular since the UN Millennium Ecosystem Assessment in 2005. While ES is not novel in making the connection between ecosystems and sustaining human life, it has catalyzed a breakthrough in research focused on the relationship between ecosystems and human wellbeing.²⁴⁴ The ES organizational framework brings together ecosystem science and normative human values to elaborate a more holistic and comprehensive view of the benefits ecosystems provide. ES research, including international initiatives such as TEEB, has been motivated by policy objectives to better integrate ES considerations into decision making, and thereby shift decisions in favour of protecting ecosystems. While ES is not a panacea for achieving sustainability, ES-based approaches have a number of advantages in confronting the ecological and economic development challenges facing modern society.

²³⁹ Cook and Spray supra (n 68).

²⁴⁰ Bull et al. supra (n 10); Liu et al. supra (n 232); Primmer and Furman supra (n 114); Peterson et al. supra (n 98); Cook and Spray supra (n 68).

²⁴¹ Farley supra (n 228).

²⁴² Ruhl, Kraft and Lant supra (n 154).

²⁴³ Schröter et al. supra (n 162); Bull et al. supra (n 10); Farley supra (n 228); Cook and Spray supra (n 68).

²⁴⁴ Norgaard supra (n 122); de Groot et al. supra (n 108).

There are increasingly robust tools to support ES assessment and valuation for policy applications. One of the greatest strengths of ES-based approaches is expanding consideration of nature outside the bounds of the traditional environmental policy arenas. ES assessment has enabled improved comparative analysis of the trade offs between different ecosystem uses, and is capable of high-level planning across sectors such as land use planning, water, forestry, agriculture, public health, and urban development. ES valuation methods have also enabled the representation in monetary terms of a more holistic range of ecosystem values, compared to the limited range of provisioning services whose value was traditionally understood. ES supports better policy traction by emphasizing the relevance of ecosystem considerations to anthropocentric interests.

There is nothing inherent in ES-based approaches that prioritizes certain ecosystem uses over others. ES also does not presume a particular political or economic system. ES analysis emphasizes ecosystem considerations that have traditionally been overlooked, but broader governance frameworks will direct how ES knowledge is utilized. There is reason for caution where specific ES are itemized and heavily prioritized over others. These concerns may be exacerbated through monetary valuation of ES, and where cultural or intrinsic values of nature are not also considered. The need for holistic, integrated approaches, which has been more broadly identified in sustainable development, IWRM and biodiversity policy, remains true for ES-based approaches.

ES has been useful as an advocacy and communications tool, enhancing political and stakeholder support for ecosystem protection.²⁴⁵ Some authors conclude that the ES concept has effectively changed the terms of discussion, so that it has now become widely recognized that nature conservation does not necessarily pose a trade-off between the environment and the economy.²⁴⁶ ES has also advanced interdisciplinary research and integrated policy development, while implementation of integrated approaches remains challenging and can be hampered by existing sectorial structures. There are promising examples of implementation of ES-based approaches and opportunities to further apply ES in law, policies and management decisions, while implementation of ES remains underdeveloped compared to its theoretical potential.²⁴⁷

Payments for Ecosystem Services are one type of tool to implement the ES concept towards ecosystem protection, and will be examined in Chapter 3. Some key themes can be drawn out of

²⁴⁵ Bull et al. supra (n 10).

²⁴⁶ de Groot et al. supra (n 108).

²⁴⁷ Bull et al. supra (n 10).

the broader discourse around ES-based approaches that inform the focus of this thesis on the role legal frameworks in the governance of PES. Given the importance of broader frameworks in determining how ES knowledge is utilized in decision-making, the case studies will consider how the law shapes the institutions and processes through which PES schemes are implemented. Legal frameworks for PES also provide leading examples of the ES concept being reflected in law, providing an opportunity for the case studies to consider how and to what extent the law codifies the idea of ES and the ES framework, and provides guidance on ES assessment and valuation. The case studies will also consider how the legal frameworks for PES address the itemization and prioritization of ES and the scope of considerations that are built into decision-making. Finally, the case studies will consider how legal frameworks for PES contribute to the goal of integrated policy, linking ES with broader policy around sustainable development, biodiversity and water.

CHAPTER 3: PAYMENTS FOR ECOSYSTEM SERVICES

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3.1 Introduction

‘Payments for Ecosystem Services’ (PES) is a term used to describe a range of schemes that create positive incentives for ‘providers’ of ES to protect and restore ecosystems, most commonly to secure benefits from ES related to fresh water, carbon storage, and the maintenance of biodiversity.¹ PES can be seen as a mechanism to translate external, non-market values related to ES into economic incentives.² While incentive-based approaches for environmental protection and nature conservation pre-exist the PES terminology and are not necessarily linked to the ES concept, discourse around PES is increasingly influential.³ The scope of programmes identified under the PES

¹ While carbon, biodiversity and water remain the most common, PES schemes for marine ecosystem protection are also on the rise: J Salzman et al. ‘The global status and trends of Payments for Ecosystem Services’ (2018) 1 *Nature Sustainability* 136.

² S Engel, S Pagiola and S Wunder ‘Designing payments for environmental services in theory and practice: An overview of the issues’ (2008) 65 *Ecological Economics* 663.

³ BK Jack, C Kousky and KRE Sims, ‘Designing payments for ecosystem services: lessons from previous experience with incentive-based mechanisms’ (2008) 105 (28) *Proceedings of the National Academy of Sciences of the United*

umbrella is broad,⁴ with PES appearing to have “become a catch phrase... [for] virtually all financial and legal incentive mechanisms for promoting conservation and good environmental citizenship”.⁵ The use of the term ‘payments for ecosystem services’ in academic work has grown from just three journal references in 1995, to over 1,900 journal references in 2016,⁶ and there remain fundamental debates around defining PES, its underlying rationale, and whether and in what circumstances it is an appropriate tool.

At the same time, PES is being implemented with real impacts on the ground; 550 active schemes were identified worldwide in 2015, representing combined annual payments of US \$36 billion.⁷ PES has been applied at a range of scales and across sectors such as agriculture, water management, climate change mitigation, and biodiversity conservation.⁸ PES schemes are most prevalent in the context of watershed protection, where there are relatively clear links between the condition of upstream ecosystems and downstream water users.⁹ PES is gaining traction as a viable complement to existing approaches to watershed management; successful schemes are demonstrating that it can be cost-effective to invest in protecting ecosystems such as forests, wetlands, and semi-natural areas such as agricultural land to naturally filter out pollutants, regulate water flows, recharge groundwater, and absorb flooding, compared to the cost of building infrastructure such as storm walls and secondary treatment plants.¹⁰

A number of international actors have been active in promoting PES approaches, and have influenced perceptions of PES, and its design and implementation in important ways. The

States of America 9465; R Pirard and R Lapeyre, ‘Classifying market-based instruments for ecosystem services: A guide to the literature jungle’ (2014) 9 *Ecosystem Services* 106.

⁴ S Schomers and B Matzdorf, ‘Payments for ecosystem services A review and comparison of developing and industrialized countries’ (2013) 6 *Ecosystem Services* 16; S Wunder ‘Revisiting the concept of payments for environmental services’ (2015) 117 *Ecological Economics* 234.

⁵ T Greiber (ed), *Payments for Ecosystem Services: Legal and Institutional Frameworks* (IUCN 2009).

⁶ According to a systemic literature review reported in: Salzman et al. supra (n 1).

⁷ Salzman et al. supra (n 1).

⁸ Schomers and Matzdorf supra (n 4); Salzman et al. supra (n 1); I Porras, B Alyward, and J Engel ‘Monitoring payments for watershed services schemes in developing countries’ (International Institute for Environment and Development 2013).

⁹ Salzman et al. supra (n 1); M Smith et al. *Pay: Establishing Payments for Watershed Services* (IUCN 2006); I Bond and J Mayers, *Fair Deals for Watershed Services: Lessons from a Multi-Country Action-Learning Project* (International Institute for Environment and Development 2010); D Southgate and S Wunder, ‘Paying for watershed services in Latin America: a review of current initiatives’ (2009) 28(3) *Journal of Sustainable Forestry* 497.

¹⁰ G Bennett and F Ruef, *Alliances for Green Infrastructure State of Watershed Investment 2016*, (Forest Trends, 2016).

Economics of Ecosystems and Biodiversity¹¹, the United Nations Development Program¹² and the Centre for International Forestry Research¹³ have led research to support the implementation of PES. As of 2014, the World Bank's Global Environment Facility had funded 57 biodiversity and sustainability projects where PES was a component.¹⁴ The United Kingdom Department for Environment Food and Rural Affairs led an internationally significant study on best practices for PES.¹⁵ The International Institute for Environment and Development has also produced a large body of research on PES.¹⁶ The Katoomba Group, launched by the not-for-profit organization Forest Trends in 1999, is an influential working group that promotes PES approaches and has provided advice to international organisations, business and governments on PES implementation.¹⁷ Large international conservation NGOs, including the Nature Conservancy, World Wildlife Fund¹⁸ and Conservation International¹⁹ have also been active in developing and supporting PES schemes.

This chapter provides a foundation on PES and an introduction to legal frameworks for PES. Section 3.2 reviews diverging perspectives on how PES should be scoped and defined, and provides an overview of key concepts that are applied in the design of PES. Section 3.3 provides an overview and examples of PES in practice, with particular attention to PES applied to protect drinking water sources. Section 3.4 provides a critical analysis of the theory and policy rationale underlying PES approaches, pointing to the need for policy interventions and governance to guide PES administration and design. Section 3.5 reviews the role of legal frameworks in the administration and design of PES and introduces the categories of legal frameworks that will be used to structure the case studies in Chapters 4, 5 and 6. Section 3.6 summarizes the main conclusions from this chapter and identifies key themes that will be explored in the case studies.

¹¹ 'The Economics of Ecosystems and Biodiversity' <<http://www.teebweb.org>> accessed 8 May 2018.

¹² 'Payments for Ecosystem Services' (UNDP)

<<http://www.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html>> accessed 8 May 2018.

¹³ *Payments for Ecosystem Services (PES): A practical guide to assessing the feasibility of PES projects* (CIFOR 2014).

¹⁴ Global Environment Facility, *GEF Investments on Payment for Ecosystem Services Schemes*. (World Bank 2014).

¹⁵ *Payments for Ecosystem Services: A Best Practice Guide* (Defra 2013).

¹⁶ 'Payments for Ecosystem Services' (IIED)

<<http://pubs.iied.org/search/?k=payments+for+environmental+services>> accessed 8 May 2018.

¹⁷ 'Our Strategy' <<http://www.katoombagroup.org/about.php>> accessed 8 May 2018.

¹⁸ 'Payments for Ecosystem Services' (WWF)

<http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/danube_carpathian/our_solutions/green_economy/pes/> accessed 8 May 2018.

¹⁹ Ecosystem Finance: Innovative Solutions for Lasting Conservation (Conservation International, undated).

3.2 Definitions and Key Concepts

3.2.1 Defining Payments for Ecosystem Services

There are conflicting perspectives on how PES should be defined, the scope of programs that should be considered under the PES label, and how to distinguish PES from other economic instruments in environmental policy.²⁰ In practice, a wide array of programs are self-described as PES without attention to academic definitions, while other programmes do not use PES terminology, but are considered as examples of PES in the literature. Some argue that PES discourse should encompass diverse programs with the potential to secure ecosystem services through the use of incentives.²¹ Typically, PES relates to incentives used to change land use for conservation purposes. Broad, encompassing definitions have been proposed that use PES as an umbrella term that describes: “the exchange of value for land management practices intended to provide or ensure ecosystem services.”²² Descriptions of PES are often couched in market terminology, for example: “any transaction, voluntary or regulated where there is a payment or exchange of credits (not necessarily monetary) between a buyer and seller that promotes some improvement of an ecosystem service”.²³

Many authors consider trading and offset programs as a type of PES, referring to a spectrum of water quality trading programs and other quantity-driven mechanisms like biodiversity habitat and wetland mitigation banking programs, instream flow restoration certificates, and carbon emission cap and trade programs.²⁴ Product-based certification and labelling schemes, such as certified timber or coffee, are another market-based mechanism that is sometimes considered under the PES umbrella: the premium costumers are willing to pay to cover the additional cost of producing a product in a way that protects ES can be considered a ‘payment’ for that ES.²⁵

²⁰ Wunder supra (n 4); R Muradian et al. ‘Reconciling theory and practice: an alternative conceptual framework for understanding payments for environmental services’ (2010) 69(6) *Ecological Economics* 1202; L Tacconi ‘Redefining payments for environmental services’ (2012) 73(1) *Ecological Economics* 29; J Farley and R Costanza, ‘Payments for ecosystem services: from local to global’ (2010) 69(11) *Ecological Economics* 2060; Jack, Kousky and Sims supra (n3); Pirard and Lapeyre supra (n 3).

²¹ Greiber supra (n 5).

²² Salzman et al. supra (n 1), 136.

²³ BA Willaarts et al. ‘Legal Framework and Economic Incentives for Managing Ecosystem Services’ in BA Willaarts, A Garrido, and MR Llamas (eds.) *Water for Food and Wellbeing in Latin America and the Caribbean: Social and Environmental Implications for a Globalized Economy* (Routledge 2014) 365, 368, adapted from Y Stanton et al. *State of Watershed Payments: An Emerging Marketplace* (Ecosystem Marketplace 2010).

²⁴ Willaarts et al. supra (n 23); Smith et al. supra (n 9); Greiber supra (n 5); Bennett and Ruef supra (n 10).

²⁵ S Wunder ‘Payments for environmental services: some nuts and bolts’ (2005) CIFOR Occasional Paper No. 42.

Arguing that it is necessary to better distinguish PES from other types of conservation and environmental incentive schemes, some proposed definitions limit PES to payments that are the subject of an explicit agreement, for example:

*[A]ny payment arrangement where those who pay are aware that they are paying for an ecosystem service that is valuable to them or to their constituencies – and those who receive the payments engage in meaningful and measurable activities to secure the sustainable supply of the ecosystem services in question.*²⁶

The requirement that parties to PES arrangements be fully aware of what is being paid for is highlighted in some discussions as a key feature of PES.²⁷

The most widely cited and critiqued definition of PES is the Wunder (2005) definition, which proposes that ‘true’ or ‘genuine’ PES must meet the following five criteria:²⁸ i) a voluntary transaction in which; ii) a well-defined environmental service, or a form of land use likely to secure that service; iii) is bought by at least one ES buyer; iv) from a minimum of one ES provider; v) if and only if the provider continues to supply that service. While this definition does not exclude the government as a potential buyer, it envisions PES in a market context where ES is exchanged through direct, voluntary, negotiation between buyers and sellers. This definition has been widely criticized because it does not reflect the reality of many PES schemes; as discussed below, there is particular concern around the concept that individualised ES can be commoditised and exchanged.²⁹ Furthermore, the prescriptive characterization of what represents ‘true’ PES implies that other conceptions of PES are invalid, and may frustrate practitioners, diverting their focus to meeting theoretical expectations.³⁰

In response to critiques, a revised definition was proposed by Wunder (2015), describing PES as: i) voluntary transactions; between ii) service users; and iii) service providers; iv) that are conditional on agreed rules of natural resource management; v) for generating offsite services.³¹ This removes market terminology of ‘buyer’ and ‘seller’ and the concept of a ‘well defined ES’ being

²⁶ Greiber supra (n 5), 6.

²⁷ Global Environment Facility supra (n 14).

²⁸ Wunder supra (n 25).

²⁹ S Pagiola and G Platais, *Payments for Environmental Services: From Theory to Practice* (World Bank 2007); S Naeem, et al. ‘Getting the science right when paying for nature’s services: Few projects adequately address design and evaluation’ (2015) 347 *Science* 6227; MM Sommerville, JP Jones and EJ Milner-Gulland ‘A revised conceptual framework for payments for environmental services’ (2009) 14(2) *Ecology and Society* 34; Tacconi supra (n 20); Muradian et al. supra (n 20).

³⁰ Muradian et al. supra (n 20).

³¹ Wunder supra (n 4), 8.

exchanged, while maintaining the criteria of voluntary transactions based on agreed-upon actions. The criteria of 'offsite' ES requires that the benefits from ES are gained outside the area that is targeted for intervention. Wunder argues that this focused definition is helpful as a model for comparative purposes, rather than a strict method for prescribing what is and is not PES.³²

In practice, PES schemes take place in a non-free-market context, and their design and administration is often led by governments or other public interest actors towards specific policy goals.³³ Descriptions that characterise PES as market transactions have been criticized for “not pay[ing] enough attention to the role of institutions and shared beliefs in shaping PES design and outcomes, even if these are critical under ‘non-perfect’ market situations”.³⁴ Commonly cited as a more socially-attuned definition, Muradian (2010) regards PES as: “a transfer of resources (monetary or not) between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources”.³⁵ This definition adopts a normative frame, necessitating that PES contribute to the public interest in ES. Other definitions reflect the reality that most PES schemes entail an application process, rather than being a transaction between two parties in equal negotiating positions, for example: “a positive economic incentive where environmental service providers can voluntarily apply for a payment that is conditional either on ES provision or on an activity clearly linked to ES provision.”³⁶

The definitions above introduce a number of terms and key concepts, which are unpacked in the following section 3.2.2. The conflicting definitions reflect fundamental differences in the theoretical perspectives and rationale underlying PES. These differences have important implications for the administration and design of PES, and the role PES is envisioned to have in management of ecosystem services, as will be explored in the sections that follow. This thesis does not endorse a particular definition of PES, and different approaches to implementing PES are explored in each of the case studies in Chapters 4, 5 and 6. For the purposes of evaluating legal frameworks for PES in the case studies, this thesis considers only PES schemes that entail direct payments based on an explicit agreement. The design considerations and policy and legal

³² Wunder supra (n 4).

³³ R Costanza 'Ecosystem Services in Theory and Practice' in M Potschin et al. (eds) *Routledge Handbook of Ecosystem Services* (Routledge 2016); Muradian et al supra (n 20); Schomers and Matzdorf supra (n 4).

³⁴ Muradian et al. supra (n 20), 1205.

³⁵ Muradian et al. supra (n 20), 1205.

³⁶ S Engel 'The devil in the detail: A practical guide on designing payments for environmental services' (2016) 9(1-2) *International Review of Environmental and Resource Economics* 131.

frameworks for such schemes differ substantially from other mechanisms such as trading and offsets. However, this is without comment on whether or not it is helpful to consider a broader range of schemes under the PES banner for different purposes, and section 3.3.3 provides a brief overview of a range of different schemes.

3.2.1 Key Concepts for the Design of Payments for Ecosystem Services

“*Service providers*”, “sellers” or sometimes “stewards” refer to actors that affect the provision of ES, usually landowners, tenants or those occupying land. The critical factor is that they must be in a position to affect the condition of the ecosystems that provide ES.³⁷

“*Service users*”, “buyers” or “beneficiaries” refer to those willing to pay for ES.³⁸ These may be individuals or private entities that benefit directly from ES, or local or national governments or non-governmental organizations that fund PES to secure benefits for communities or the public at large.³⁹ PES is generally based on the principle that those who benefit from ecosystem services should pay to protect them. In this way, PES is focused on rewarding positive externalities. Funding arrangements often involve multiple sources and vary depending on the scheme.

The relationship between ‘ES providers’ and ‘ES users’ varies spatially and temporally depending on the type of ES that is being considered. For example, water-related PES schemes tend to be set up within a watershed that provides a well-defined geographical setting, with a relatively clear relationship between downstream ES users and upstream landholders that are characterised as ES providers. Carbon and biodiversity services deliver benefits on much broader scales (often global), making it more difficult to identify a defined group of beneficiaries.⁴⁰ Where ES benefits accrue over the long-term, future generations can be considered within the scope of ES users and governments or philanthropic organisations may fund PES with this forward-looking view.⁴¹ International PES schemes, in particular for the protection of forests, direct payments from developed countries to developing countries, in recognition of the international value of ES and also with regard to equity considerations.⁴² PES also often directs payments from urban populations to

³⁷ Engel, Pagiola and Wunder supra (n 2).

³⁸ The term ‘beneficiary’ is commonly used to indicate those who benefit from the provision of ES, but can create confusion because the same term is also sometimes used to indicate the recipient or beneficiary of payments (i.e. ES providers).

³⁹ Engel supra (n 36).

⁴⁰ Willaarts et al. supra (n 23).

⁴¹ *Payments for Ecosystem Services Getting Started: A Primer* (Forest Trends and UNEP 2008).

⁴² *ibid.*

rural populations, establishing a mechanism that recognizes the ways in which urban lifestyles depend on services provided by rural landscapes, also with important equity considerations where urban centres are more affluent than rural areas.⁴³

Voluntariness: PES is generally regarded as an arrangement that service providers and service users enter into on a voluntary basis. For agreements to be voluntary, stakeholders must have the possibility to terminate the agreement, which distinguishes it from approaches that directly regulate land uses.⁴⁴ The voluntary nature of PES is sometimes questionable on the part of service users, in cases where government agencies are mandated to implement PES and funding comes from sources such as general budget allocations and mandatory taxes or levies.⁴⁵ On the part of service providers, it is assumed that they have *de facto* land use options, with a choice to respond or not to the incentives offered by PES.⁴⁶

Directness: PES is also sometimes distinguished from other economic incentives by the criteria that payments (or non-monetary incentives) are made directly to ES providers. Most PES entail simple payment structures that provide direct incentives to landholders.⁴⁷ As in the Wunder (2005 and 2015) definitions above, 'directness' is sometimes interpreted to mean that PES results from a direct negotiation between ES users and providers. This concept has limited applicability in practice for a number of reasons, as discussed below in section 3.3.4.

Intermediaries: In practice, PES often depends on the governance and institutional capacity of government agencies or NGOs to act as intermediaries to facilitate the negotiation of agreements and organise and administer schemes on a larger scale. This includes identifying and mobilizing participants, raising awareness and establishing trust relationships, monitoring PES implementation and outcomes, generating research on ES.⁴⁸

⁴³ P Gutman 'Ecosystem services: foundations for a new rural–urban compact' 2007 62 (3-4) *Ecological Economics* 383; S Pagiola, A Arcenas and G Platais 'Can payments for environmental services help reduce poverty? An exploration of the issues and evidence to date from Latin America' (2005) 33 (2) *World Development* 237; S Wunder, S Engel and S Pagiola 'Taking stock: A comparative analysis of payments for environmental services programs in developed and developing countries' (2008) 65(4) *Ecological Economics* 834.

⁴⁴ Engel, Pagiola and Wunder supra (n 2).

⁴⁵ A Vatn 'An institutional analysis of payments for environmental services' (2010) 69 *Ecological Economics* 1245; Schomers and Matzdorf supra (n 4).

⁴⁶ G Van Hecken and J Bastiaensen, 'Payments for Ecosystem Services: Justified or Not? A Political View' (2010) 13 *Environmental Science & Policy* 785; Wunder supra (n 25);

⁴⁷ Bond and Mayers supra (n 9).

⁴⁸ Defra supra (n 15); Porras, Alyward and Engel supra (n 8); Bond and Mayers supra (n 9).

'Conditionality'⁴⁹ is a term is used to express that payments should be conditional on results. It is argued that "[c]onditionality - the 'business-like principle' only to pay if the service is actually delivered - is the most innovative feature of PES vis-à-vis traditional conservation tools".⁵⁰ In theory, this would require the delivery of measurable ES benefits. However, strictly requiring that payments be conditional on the provision of a well-defined ES, as in the Wunder definition (2005) above, is problematic because the available science may not be able to definitively support measuring specific increments of ES that result from individual agreements.⁵¹ In practice, because ES is difficult to measure directly, PES is often conditional on actions to restore ecosystems or to refrain from activities that would degrade ecosystems (or 'inputs'), that are agreed to likely to deliver the desired ES, as opposed to being conditional on the delivery of ES itself (or 'outputs').⁵²

Implementing conditionality requires monitoring compliance with the terms of agreements and mechanisms to sanction non-compliance, such as withholding future payments and sometimes also by withdrawing past payments.⁵³ While monitoring is important to understand the effectiveness of PES schemes, implementing comprehensive monitoring and a rigid accountability framework can consume a prohibitively large fraction of the costs of payments.⁵⁴ Guidance for consistent measuring, reporting, and verification practices can reduce costs, and support the scaling up of PES.⁵⁵ While this guidance is beginning to develop in the context of PES for forest carbon sequestration, there remains little alignment and standardization of monitoring across watershed PES schemes.⁵⁶ The timeframe involved in securing ES is also relevant to the principle of conditionality. In some cases ES benefits may be experienced over the long-term, and may not be observable immediately on taking the conservation action. This is particularly relevant in the case

⁴⁹ Conditionality is a term often used in the context of international development aid, meaning that funding is conditional on certain requirements being met. E.g., see: World Bank, *Conditionality in Development Policy Lending*, (World Bank Operations Policy and Country Services, November 15 2007).

⁵⁰ Wunder supra (n 25) iv.

⁵¹ Naeem, et al. supra (n 29).

⁵² Engel supra (n 36).

⁵³ Engel, Pagiola and Wunder, supra (n 2).

⁵⁴ H Wittman, LJ Powell and E Corbera 'Financing the agrarian transition? The Clean Development Mechanism and agricultural change in Latin America' (2015) 47 *Environment and Planning* 2031.

⁵⁵ Naeem, et al. supra (n 29).

⁵⁶ Bennett and Ruef supra (n 10).

of ecosystem restoration or enhancement, where it can often take many years to establish habitat.⁵⁷

'Additionality' is a term is used to express that payments should provide an environmental outcome above the status quo, which would not be achieved if not for the payment.⁵⁸ Research has provided very mixed results when examining the effectiveness of PES for forest carbon sequestration⁵⁹, and for water protection.⁶⁰ This has led some to conclude that the lack of proven additionality is the most serious design problem facing PES.⁶¹ However, it is very difficult to assess whether land use changes would have occurred in absence of the payments without a counterfactual point of comparison.⁶² The probability of land degradation can be estimated based on socio-economic models, but research in this area remains limited due to the cost of verifying additionality relative to the cost of implementing PES.⁶³

In order to deliver the greatest improvement in ecosystem services, PES schemes can be targeted based on the selection of properties that are likely to provide the highest degree of 'additionality'.⁶⁴ This depends on assessing the level of threat to ecosystems, as well as considering the physical characteristics that affect the ES gained.⁶⁵ For example, higher levels of ES may result

⁵⁷ CT Reid and W Nsoh, *The Privatisation of Biodiversity? New Approaches to Conservation Law* (Edward Elgar Publishing 2016).

⁵⁸ JE Salzman, *A Policy Maker's Guide to Designing Payments for Ecosystem Services* (Asian Development Bank, 2009); Engel, Pagiola and Wunder, *supra* (n 2).

⁵⁹ PJ Ferraro et al. 'Estimating the impacts of conservation on ecosystem services and poverty by integrating modeling and evaluation' (2015) 112 *Proceedings of the National Academy of Sciences of the United States of America*, 7420; J Alix-García and H Wolff 'Payment for ecosystem services from forests' (2014) 6 *Annual Review of Resources Economics* 361; P Jayachandran et al., 'Cash for Carbon: A Randomized Controlled Trial of Payments for Ecosystem Services to Reduce Deforestation' (2016) NBER Working Paper 22378; GA Sanchez-Azofeifa et al. 'Costa Rica's Payment for Environmental Services program: intention, implementation, and impact' (2007) 21 *Conservation Biology* 1165; JM Alix-Garcia, EN Shapiro and KRE Sims 'Forest conservation and slippage: evidence from Mexico's national Payments for Ecosystem Services program' (2012) 88 *Land Economics* 613.

⁶⁰ R Brouwer, A Tesfaye and P Pauw 'Meta-analysis of institutional-economic factors explaining the environmental performance of payments for watershed services' (2011) 38 *Environment and Conservation* 380; H Zheng et al. 'Benefits, costs, and livelihood implications of a regional payment for ecosystem service program' (2013) 110 *Proceedings of the National Academy of Sciences of the United States of America* 16681.

⁶¹ Naeem, et al. *supra* (n 29); SK Pattanayak, S Wunder, and PJ Ferraro 'Show me the money: do payments supply environmental services in developing countries?' (2010) 4 *Review of Environmental Economics and Policy* 254.

⁶² Salzman et al. *supra* (n 1); DA Miteva, SK Pattanayak and PJ Ferraro 'Evaluation of biodiversity policy instruments: what works and what doesn't?' (2012) 28 *Oxford Review of Economic Policy* 69; S Jayachandran et al. 'Cash for carbon: a randomized trial of payments for ecosystem services to reduce deforestation' (2017) 357 *Science* 267; AE Daniels et al. 'Understanding the Impacts of Costa Rica's PES: Are We Asking the Right Questions?' (2010) 69(11) *Ecological Economics* 2116.

⁶³ Engel *supra* (n 36).

⁶⁴ Salzman et al. *supra* (n 1).

⁶⁵ Engel *supra* (n 36).

from the protection of areas containing natural features such as water bodies or certain types of vegetation. The level of benefits to ES users also depends on the strategic location of ecosystems, such as land located upstream from water users in downstream communities. Area-based targeting based on generalised criteria can be used to identify ecologically important regions that can be linked to ES; in most cases this can be supported by available scientific indicators and is relatively inexpensive to implement.⁶⁶

Design of Incentives: The design of incentives differs between PES schemes, and depends largely on the socio-economic context and policy goals. A threshold condition for PES approaches generally is that the societal benefits from ES provision should exceed the costs to ES providers in securing the ES. Typically, the minimum amount of the incentive needed for PES to be effective is considered to be an amount that would cover the ES providers' lost profits from switching activities ('opportunity costs'), as well as any direct costs incurred to carry out activities (e.g. restoring stream banks or planting trees) as well as the transaction costs involved in entering into the PES agreement. By contrast, the maximum amount of the incentive would encompass the full value of the ES gained from the perspective of ES users/ beneficiaries. In practice, payments are often set close to an estimate of opportunity costs and do not often entail an economic valuation of ES benefits.⁶⁷

In contrast to prevailing assumptions, some research suggests that PES can be effective, and is more appropriate from a policy perspective, where incentive levels are below opportunity cost; in this way, PES functions as a 'nudge' that incites participation based on existing motivations for conservation.⁶⁸ PES may also be designed explicitly to provide poverty alleviation to ES providers in addition to securing ES benefits, which may influence the amount that is considered appropriate for incentives.⁶⁹ The rationale underlying these perspectives is discussed in section 3.4, below.

A common practice in PES is to make fixed payments based on areas of land (e.g. a set rate for all ES providers, based on dollars per hectare of land where conservation activities are conducted).⁷⁰ Alternatively, payments can be differentiated either on the basis of provision costs

⁶⁶ *ibid.*

⁶⁷ *ibid.*

⁶⁸ KMA Chan, et al. 'Payments for Ecosystem Services: Rife With Problems and Potential—for Transformation Towards Sustainability' (2017) 140 *Ecological Economics* 110.

⁶⁹ Engel *supra* (n 36).

⁷⁰ *ibid.*

(paying higher amounts where opportunity cost is higher) or on the basis of environmental benefits (paying higher amounts where certain sites provide higher levels of ES).⁷¹ There is some evidence that payment differentiation increases the probability that the PES scheme will be effective in securing the intended ES.⁷² Most payments are made in cash, but in some cases in-kind payments may be more appropriate, for example where communities are not able to absorb cash in a manner that enhances welfare.⁷³

Permanence: PES is generally considered effective only if it can secure long-term, or permanent outcomes; for there to be meaningful ‘additionality’, benefits need to be maintained over time. This also recognises that benefits to humans from ecosystem services, in particular regulating/supporting services, accrue as the result of ecosystem processes that occur over relatively long time frames. This is also consistent with the view of sustainability as including present and future generations, and supports consideration of trade-offs in ES that may be experienced across generations.⁷⁴ While ‘permanence’ generally entrenched as a principle of PES, there are difficulties in establishing voluntary agreements to secure ES over the long-term.

Long-term protection of ecosystems is a challenge for conservation in general, but in particular for PES. Compared to conservation strategies such as protected areas that are owned by a state or conservation non-governmental organisation, PES tends to provide legal protections to ecosystems over a shorter period of time, depending on the duration of contracts (ranging, for example, from a one-time payment to 20 years). On the side of ES buyers, it is difficult to secure funding commitments over a long period of time. ES providers may also be unlikely to agree to restrictions on land management over the long-term, contracts do not generally bind future owners of land.⁷⁵ Mechanisms such as conservation covenants and easements are a promising way to secure long-term conservation of private lands,⁷⁶ and may be implemented, where recognized by the applicable legal systems, as part of PES (such as in the New York case study explored in Chapter 6).

⁷¹ Engel supra (n 36); Engel, Pagiola and Wunder supra (n 2).

⁷² CT Ross ‘Sliding-scale environmental service payments and non-financial incentives: Results of a survey of landowner interest in Costa Rica’ (2016) 130 *Ecological Economics* 252.

⁷³ Engel supra (n 36).

⁷⁴ M Potschin et al. ‘Ecosystem Services in the Twenty-First Century’ in M Potschin et al. (eds) *Routledge Handbook of Ecosystem Services* (Routledge 2016); United Nations World Water Assessment Programme, *The United Nations World Water Development Report 2018: Nature-Based Solutions for Water* (UNESCO 2018).

⁷⁵ Reid and Nsoh supra (n 57).

⁷⁶ *ibid.*

On the other hand, there may be a need for flexibility and adaptive management in conservation strategies, given that social priorities in protecting ES may shift in future generations, ES in new areas may become important as human settlements move, or the location of species and ecosystems may change due to climate change or other reasons.⁷⁷ The characteristics of PES as flexible, voluntary arrangements, with commitments in short to medium-term increments, and with a focus on the dynamics between ES providers and beneficiaries, may be well-suited as a tool to support an adaptive management approach.⁷⁸

Leakage refers to an unintended consequence of PES, where securing an ES by restricting activities in one location leads to the loss or degradation of ES elsewhere. For example, landholders that receive PES for the conservation of one location may continue ecologically damaging activities at the same scale by shifting their activities elsewhere.⁷⁹ This is generally of greater concern where PES pays for the protection of ecosystems, rather than active measures to restore ecosystems. Mitigating the risk of leakage may require the engagement of communities rather than individuals to participate in PES, where aggregate performance can be measured and/or the coordination of PES across landscapes.⁸⁰

Bundling, stacking and 'piggy-backing'. Conservation activities undertaken via PES typically impact multiple ES simultaneously. As reviewed in Chapter 2, there is the potential for synergies (and trade-offs) in a watershed, for example, between services such as the provision of fresh water, nutrient management, erosion control, wildlife habitat and carbon sequestration.⁸¹ Research on mapping and modelling of ES can support the design of PES to support 'bundles' of multiple ecosystem services, and tools exist that can identify and quantify a wide range of ecosystem services possible over relevant spatial and temporal scales.⁸² Most ES assessments have focused on

⁷⁷ *ibid.*

⁷⁸ Farley and Costanza *supra* (n 20); S Wunder, 'When payments for environmental services will work for conservation' (2013) 6(4) *Conservation Letters* 230.

⁷⁹ Engel *supra* (n 36).

⁸⁰ Engel *supra* (n 36); Chan *supra* (n 67).

⁸¹ S Banerjee et al. 'How to sell ecosystem services: A guide for designing new markets' (2013) 11(6) *Frontiers in Ecology and the Environment* 297.

⁸² MS Reed et al. 'A place-based approach to payments for ecosystem services' (2017) 43 *Global Environmental Change* 92.

the spatial distribution of ES supply,⁸³ while recently some studies have started to map the spatial variations in ES demand.⁸⁴

In the design of PES, payments may be made for multiple ES benefits through ‘bundling’ or ‘layering’. ‘Bundling’ refers to payments made, by a single buyer or multiple buyers, for a group of multiple ecosystem services that are provided together.⁸⁵ For example, benefits related to carbon, water quality, biodiversity, visitor benefits and reduced wildfire risk can be provided together in a single scheme designed to pay for wetland restoration.⁸⁶ Multiple ES benefits may also be provided through ‘layering’ (also called ‘stacking’) of PES schemes, which refers to multiple payments made independently for different ecosystem services provided by the same ecosystem.⁸⁷ For example, the same wetland restoration project could be supported by a carbon offset scheme in parallel with a scheme in which water companies pay for water quality benefits, in addition the collection of visitor fees linked to cultural and aesthetic values.⁸⁸

Where all co-benefits of a PES scheme are not captured by payments, the term ‘piggy-backing’ is sometimes used to refer to additional services that are provided ‘for free’ as an added result of management interventions intended to provide other ES. Those who benefit from these additional services without paying for them are sometimes referred to as ‘free riders’. However, in practice, it is unlikely that payments will cover all ecosystem services.⁸⁹ These concepts are linked to issues of externalities and market failures discussed in section 3.4.2; ultimately, it is not feasible to capture all ES within markets.

⁸³ KJF Bagstad et al. ‘From theoretical to actual ecosystem services: mapping beneficiaries and spatial flows in ecosystem service assessments’ (2014) 19(2) *Ecology and Society* 64; B Burkhard et al. ‘Mapping and modelling ecosystem services for science, policy and practice’ (2013) 4 *Ecosystem Services* 1; J Maes et al. ‘Mapping ecosystem services for policy support and decision making in the European Union’ (2012) 1 *Ecosystem Services* 31; RU Syrbe and U Walz ‘Spatial indicators for the assessment of ecosystem services: providing, benefiting and connecting areas and landscape metrics’ (2012) 21 *Ecological Indicators* 80.

⁸⁴ S Wolff, CJE Schulp and PH Verburg ‘Mapping ecosystem services demand: A review of current research and future perspectives’ (2015) 55 *Ecological Indicators* 159; B Burkhard et al. ‘Mapping ecosystem service supply, demand and budgets’ (2012) 21 *Ecological Indicators* 17; RI McDonald ‘Ecosystem service demand and supply along the urban-to-rural gradient’ (2009) 5 *Journal of Conservation Planning* 1; CJE Schulp, S Lautenbach and PH Verburg ‘Quantifying and mapping ecosystem services: demand and supply of pollination in the European Union’ (2014) 36 *Ecological Indicators* 131.

⁸⁵ Defra supra (n 15); Banerjee supra (n 82); Engel supra (n 36).

⁸⁶ Defra supra (n 15).

⁸⁷ Defra supra (n 15); Banerjee supra (n 82); Engel supra (n 36).

⁸⁸ Defra supra (n 15).

⁸⁹ Banerjee supra (n 82).

3.3 Payments for Ecosystem Services in Practice

3.3.1 Overview

The growing interest in PES is not merely theoretical; practical implementation of PES and the use of this term to describe incentive-based schemes has grown significantly in the past two decades and continues to trend upwards.⁹⁰ PES schemes operate in both developed and developing countries, at local, national and international levels, organized by governments, NGOs, and sometimes by private entities. Regionally, examples of PES can be found on every continent. Notably, Latin America leads in the number of schemes for watershed protection. China represents the single largest source of investment in PES, which has become a central component of its national environmental protection strategy. Agri-environmental programs in the United States and the European Union can also be considered some of the longest running PES programs, although they have not typically used PES terminology.⁹¹ Many sub-national and non-governmental PES schemes have emerged in the United States; one comprehensive study a decade ago estimating that PES for watershed protection, carbon sequestration and biodiversity totaled US \$1.9 billion in the United States in 2007.⁹²

Given that PES includes many different types of schemes, it can be challenging to assess the status of PES mechanisms generally. Ecosystem Marketplace, an initiative of the not-for-profit organization Forest Trends, is a leading source of information that has been tracking market-based mechanisms related to ES worldwide since 2005.⁹³ A recent global review of PES, based on Ecosystem Marketplace data, identified 550 active schemes in 2015 focussed specifically on ES (*not* including schemes such as agri-environmental programs where ES protection is only one component); these schemes together represented over US \$36 billion in annual transactions.⁹⁴ Reviews of PES tend to distinguish schemes as being either government-led (sometimes called ‘public’), user-financed (sometimes called ‘private’), or compliance-based, while acknowledging that some schemes are hybrids of these types.⁹⁵ PES is also distinguished based on three broad groups of ES: biodiversity, land-use carbon (most often concerned with forests), and water, while many

⁹⁰ Salzman et al. supra (n 1).

⁹¹ Schomers and Matzdorf supra (n 4).

⁹² Smith et al. supra (n 9).

⁹³ ‘Ecosystem Marketplace’ (Forest Trends) <<http://www.ecosystemmarketplace.com>> accessed 3 April 2018.

⁹⁴ Salzman et al. supra (n 1).

⁹⁵ Salzman et al. supra (n 1); Vatn supra (n 45); Schomers and Matzdorf supra (n 4).

schemes consider multiple ES.⁹⁶ The sections below provide an overview and examples of these different types of PES, with particular attention to PES schemes for the protection of drinking water.

3.3.2 Government-led Payments for Ecosystem Services

Government-led PES schemes are characterized by third parties, often national or sub-national governments, making payments on behalf of ES users. The key distinguishing feature is that payments are not made by the parties who benefit directly from ES. Ecosystem Marketplace tracked 16 government-financed biodiversity protection schemes, 31 government-financed forest carbon schemes and 203 government-financed watershed protection schemes in 2015. In many of these examples payments come from a hybrid of sources, where direct users contribute to government-led schemes, either voluntarily or through user-fees, taxes and other charges (but payments are not made directly by users to ES providers).⁹⁷

Costa Rica's national PES programme is one of the best-known examples of government-financed PES.⁹⁸ The Costa Rican example is also notable as one of the earliest applications of an ES approach, including codification of ES terminology in legislation. While it preceded the MEA by almost a decade, the PPSA was influenced by the promotion of an ES approach by international policy organizations, including UNEP.⁹⁹ Mexico drew on the PPSA model to establish forest conservation payments for hydrological services in 2003, which evolved into the umbrella program ProArbol, covering biodiversity and carbon sequestration.¹⁰⁰ Similarly, the *Bolsa Florestal* program in Brazil's Amazonas State remunerates sustainable forest activities.¹⁰¹ Ecuador has also developed a comprehensive set of rules to support its national PES programme, *Proyecto Socio Bosque*, which has provided conservation incentives since 2008 and has influenced the development of a similar program in Bolivia.¹⁰²

⁹⁶ Salzman supra et al. (n 1).

⁹⁷ Greiber supra (n 5).

⁹⁸ I Porras et al., *Learning from 20 Years of Payments for Ecosystem Services in Costa Rica* (International Institute for Environment and Development 2013).

⁹⁹ T Garvin et al. "Growing together": transnational policy networks and environmental policy change in Costa Rica" (2015) 7(1) *Int. J. Society Systems Science* 1.

¹⁰⁰ 'ProArbol' (the REDD desk) <www.theredddsk.org/countries/initiatives/proarbol> accessed 1 October 2015.

¹⁰¹ 'Bolsa Floresta Program' (Amazonas Sustainable Foundation) <www.fas-amazonas.org/programa-bolsa-floresta/?lang=en> accessed 1 October 2015.

¹⁰² 'Socio Bosque comparte experiencias con delegación boliviana [Socio Bosque Shares Experiences with Bolivian Delegation]' (Gobierno Nacional de la Republica de Ecuador [Government of the Republic of Ecuador]) <www.sociobosque.ambiente.gob.ec/node/690> accessed 4 October 2015.

China has implemented watershed PES programs on the largest scale, investing over US\$50 billion from 2000 to 2009 and engaging millions of rural households, in response to severe flooding and droughts linked to deforestation.¹⁰³ These programmes, like many other government-financed PES programmes, also have an explicit additional objective of rural economic development. Some also argue that agri-environmental programs in the United States and the European Union exhibit very similar features to these national programs, and should contribute to PES discourse.¹⁰⁴ South Africa's Working for Water Program is another example, which pays participants to clear catchments of invasive alien trees in order to restore hydrological functioning, biodiversity, natural fire patterns, and the productive potential of land.¹⁰⁵

3.3.3 User-financed Payments for Ecosystem Services

User-financed PES schemes are distinguished by payments made by the direct users of ES, which may be individuals, companies, NGOs or public actors that benefit directly from ES. In the case of biodiversity, it is often difficult to identify direct users, or more appropriate to view biodiversity as a public good that the general public has an interest in protecting.¹⁰⁶ Since the general public benefits from biodiversity conservation, some assessments consider government-financed PES for biodiversity (which were included in the figures for government-led schemes, above) to instead be in the category of user-financed schemes. Otherwise, water-related PES is the only area where user-financed schemes have truly been established. Ecosystem Marketplace identified 153 active use-financed schemes for watershed protection in 2015.¹⁰⁷ This includes, for example, payments by hydroelectric companies to landholders in the upper watershed in order to control erosion, or payments by water service providers to landholders to protect sources of drinking water. Vietnam provides an example of a hybrid model that covers ES related to water, biodiversity, forest carbon, and tourism, which is government-led, since it is coordinated by

¹⁰³ J Liu et al. 'Ecological and socioeconomic effects of China's policies for ecosystem services' (2008) 105 *Proceedings of the National Academy of Sciences of the United States of America* 9477.

¹⁰⁴ Schomers and Matzdorf supra (n 4).

¹⁰⁵ JK Turpie, C Marais and JN Blignaut 'The working for water programme: evolution of a payments for ecosystem services mechanism that addresses both poverty and ecosystem service delivery in South Africa' (2008) 65(4) *Ecological Economics* 788; Schomers and Matzdorf supra (n 4).

¹⁰⁶ Salzman et al. supra (n 1).

¹⁰⁷ *ibid.*

government, but also primarily user-financed, through government-imposed user fees as well as voluntary contributions. This model has been replicated in Cambodia, Laos, and Thailand.¹⁰⁸

Examples of ‘Private’ Payments for Ecosystem Services. PES schemes that are funded by private entities, and negotiated directly with ES providers, are sometimes distinguished as ‘private’ PES.¹⁰⁹ While ‘private’ PES has received disproportionate attention in the literature, there are relatively few examples in practice.¹¹⁰ The case of Vittel in France is often cited as an example of ideal ‘private’ PES: in order to reduce the risk of contamination of the source aquifer for its bottled mineral water, the company entered into agreements with farmers in the watershed to finance changes in land use practices. Another example is a scheme led by companies to reduce erosion caused by deforestation in the Panama Canal watershed: an insurance company and major users of the canal (including Walmart and Sony) funded reforestation in the watershed in order to reduce shipping interruptions due to dredging.¹¹¹ However, even these examples rely on intermediary institutions and do not align well the theory of direct bargaining for PES.¹¹² This has led some to conclude that the prospects for private sector involvement in funding PES are often overestimated.¹¹³ However, while the theory of ‘private PES’ is not borne out in practice, others point out that the private sector is increasingly engaged in PES. This is both in response to public expectations for corporate social responsibility, and to manage direct business risks related to degraded ecosystems.¹¹⁴

3.3.4 Compliance-based Payments for Ecosystem Services

Compliance-based PES refers to schemes where payments are made in order to meet regulatory obligations to compensate for impacts on ES, often through a standardized credit or offset that satisfies mitigation requirements. Ecosystem Marketplace identified 31 water-related compliance based schemes in 2015, including water quality trading and in-stream buybacks. There are numerous examples of biodiversity offset programs, with wetlands mitigation banking being the

¹⁰⁸ VK Kolinjivadi and T Sunderland ‘A review of two payment schemes for watershed services from China and Vietnam: the interface of government control and PES theory’ (2012) 17(4) *Ecology and Society* 10.

¹⁰⁹ Engel supra (n 36); Greiber supra (n 5).

¹¹⁰ Schomers and Matzdorf supra (n 4).

¹¹¹ Forest Trends and UNEP supra (n 41).

¹¹² Forest Trends and UNEP supra (n 41); D Perrot-Maître, *The Vittel payments for ecosystem services: a “perfect” PES case?* (International Institute for Environment and Development 2006)

¹¹³ Tacconi supra (n 20); Vatn supra (n 45).

¹¹⁴ See, for example, work related to ecosystem services by a non-profit organization representing a network of private companies in developing sustainable business strategies: ‘Business for Social Responsibility’ <<https://www.bsr.org/en/collaboration/groups/natural-capital>> accessed 2 December 2018.

best known example. Ecosystem Marketplace identified 104 active compliance-based PES schemes for biodiversity in 2015).¹¹⁵ Such schemes remain controversial, with concerns that they endorse habitat destruction, and that degraded biodiversity in one place is not readily interchangeable with biodiversity protection elsewhere.¹¹⁶ Ecosystem Marketplace identified 17 compliance base schemes related to securing land-based carbon storage. This includes greenhouse gas emissions trading schemes that encompass carbon sequestered through reforestation and other land use practices, which are standardized in the form of carbon credits. These schemes have received the most attention internationally as part of climate change mitigation efforts,¹¹⁷ with deforestation and forest degradation accounting for at least 11 per cent of global greenhouse gas emissions.¹¹⁸

Reducing Emissions from Deforestation and Forest Degradation (REDD+) is a mechanism developed by Parties to the United Nations Framework Convention on Climate Change¹¹⁹, and dominates PES related to forest carbon. It creates a financial value for the carbon stored in forests by offering incentives for developing countries to reduce emissions from forested lands, with multiple objectives of conservation, sustainable management of forests and enhancement of forest carbon stocks.¹²⁰ Developed countries have pledged over US\$8 billion in funds (with 46 per cent from Norway) for ‘REDD Readiness’, in order for recipient countries to develop the necessary technical capacity and institutional frameworks to direct payments to local projects and to meet rigorous standards to demonstrate avoided emissions. Another US\$3 billion has been pledged for payments for actual emissions reductions through 2020.¹²¹

The Paris Agreement explicitly recognized the importance of forests in mitigating climate change, but negotiations have not yet resulted in agreement on the role for forest and land-use carbon offsets in meeting emissions reduction targets. Also, significantly, neither the Clean Development Mechanism nor the European Union Emissions Trading Scheme has directed large investment flows to forest conservation. California’s Air Resources Board has been more receptive,

¹¹⁵ Salzman et al. (n 1).

¹¹⁶ C Reid ‘Between Priceless and Worthless: Challenges in Using Market Mechanisms for Conserving Biodiversity’ (2013) 2(2) *Transnational Environmental Law* 217; M Maron et al. ‘Conservation: stop misuse of biodiversity offsets’ (2015) 523 *Nature* 401.

¹¹⁷ Salzman et al. supra (n 1).

¹¹⁸ ‘REDD Facts’ (UN REDD+) ‘<http://www.unredd.net/documents/redd-papers-and-publications-90/un-redd-publications-1191/fact-sheets/15279-fact-sheet-about-redd.html>’ accessed 2 March 2018.

¹¹⁹ United Nations Framework Convention on Climate Change, U.N. Doc. A/AC.237/18 (Part II) (1992).

¹²⁰ ‘REDD Facts’ supra (n 119).

¹²¹ Salzman et al. supra (n 1).

with 65 per cent of all offsets issued in 2017 being related to forestry and land-use projects. There remains considerable uncertainty about the future of REDD+, depending on how many national and subnational programmes will accept REDD+ credits from other countries for compliance obligations.¹²²

Although a detailed assessment of REDD+ is beyond the scope of this thesis, it is worth particular mention because it has had important impacts on PES broadly in terms of influencing standards for PES design. REDD+ has developed a comprehensive framework (including the Verified Carbon Standard and Jurisdictional and Nested REDD+ framework), which provides a global governance standard for accounting, crediting and monitoring national, sub-national and nested projects in a consistent and transparent manner.¹²³ In many developing countries, the evolution of legal and institutional frameworks as part of 'REDD Readiness' has influenced or merged with broader national frameworks for PES - this is occurring in each of the Latin American case studies explored in Chapter 4 (Costa Rica and Ecuador) and Chapter 5 (Peru and Colombia).

3.3.5 PES schemes for Drinking Water Protection

PES schemes for drinking water protection have provided the most prominent and most successful examples of PES. As discussed in Chapter 2, the nature of watersheds makes it relatively easy to link upstream land management practices with downstream impacts on water quality and quantity. For this reason, PES to reduce erosion for reasons besides drinking water (e.g. hydroelectricity), and to reduce flooding (e.g., this is a significant focus of China's national PES programme) are also relatively successful. However, the universal need for communities to secure drinking water supplies makes PES related to drinking water protection the most ubiquitous example. The institutional considerations for linking ES users and ES providers is also relatively simple compared to other types of PES, since structures normally exist to collect funds from diffuse ES beneficiaries (e.g. through water utilities), which reduces transaction costs.¹²⁴

Many PES programs encompass the idea that natural systems in the form of 'green infrastructure' can complement traditional 'grey' or built infrastructure in the system for drinking water service provision, as outlined in Chapter 2. These solutions can often be implemented at lower cost and in an incremental fashion that avoids large upfront capital costs. In 2015,

¹²² Salzman et al. *supra* (n 1).

¹²³ L Denier et al., *The Little Book of Legal Frameworks for REDD+* (Global Canopy Programme 2014).

¹²⁴ Salzman et al. *supra* (n 1).

governments, water utilities, companies, and communities worldwide spent almost US \$25 billion on payments for green infrastructure for water, with recent increases of 11.8 per cent per year on average between 2013 and 2015. Almost all of this (\$23.7 billion) came from national and sub-national governments to protect critical habitats related to water (with figures skewed by China as the single biggest source of payments). Still, \$657 million in payments were made directly by water users represented by cities, companies or water utilities (which does *not* include the contributions of water users to government-led schemes). In total, these payments protected, rehabilitated, or created new habitat on more than 486 million hectares of land (an area nearly 1.5 times the size of India). About US \$16 billion was paid to landholders to reward good stewardship.¹²⁵

‘Water funds’ are a specific type of PES mechanism that has experienced significant growth: Ecosystem Marketplace identified 95 examples in 2015, compared to only emergent concepts in 2005. They are characterized by a centralized fund paid into by public and private parties, often including municipalities, companies, NGOs and governments. Monies are normally held in trust and administered by an independent board based on guidelines to determine how investments are applied for watershed conservation and restoration (rather than this being decided by individual contributors.) Water funds have become a prevalent tool in Latin America, and are significantly influencing strategies for protecting drinking water sources in the region, while they are also becoming more common in North America and Europe. The level of private sector contributions varies by region: representing 45 per cent in Europe, and 12 per cent in North America. Funds from the private sector and NGOs combined were reported together in Latin America, representing nearly 50 per cent of funds. However, water utilities typically have *not* participated in these funds, possibly due to legal constraints on their ability to pool funds with other parties towards PES.¹²⁶

3.4 Critique of Theory and Rationale Underlying Payments for Ecosystem Services

3.4.1 Overview of Economic Theory Applied to Payments for Ecosystem Services

PES is predicated on the assumption that economic considerations motivate decisions about how lands and resources are used, and that positive economic incentives can shift decisions towards ecosystem conservation and restoration. The rationale typically used to support PES is grounded in neoclassical environmental economics, specifically market theory and the theory of environmental externalities. Externalities are theorized as costs (negative externalities) and benefits

¹²⁵ Bennett and Ruef *supra* (n 10).

¹²⁶ *ibid.*

(positive externalities) that result from a market transaction, but are incurred outside that transaction. In the environmental context, externalities include impacts on the environment that increase or decrease the provision of ES, but are not accounted for in the market. For example, the market price for timber and agricultural products typically does not reflect the costs associated with degraded water quality and quantity, loss of biodiversity habitat, and carbon emissions. Conversely, if forests and agricultural lands are managed in a way that better protects water, biodiversity habitat and carbon sinks, these benefits are typically not reflected in the market either. Environmental economics posits that the failure of markets to account for environmental externalities is the root cause of ecosystem degradation.¹²⁷

The failure of markets to account for ES is linked to the nature of many ES as public goods or common pool resources, meaning they are open access in character. The value of provisioning services, such as timber, fuel and food, is reflected in the market because these ES are private goods that can be exchanged between identifiable buyers and sellers. In contrast, there is typically no market mechanism to represent the value of most regulating/maintenance and cultural ES, such as watershed protection, carbon sequestration, biodiversity, and scenic beauty, despite their high aggregate value to society.¹²⁸ As a result, ES are underprovided in the market, and prices do not signal their scarcity or degradation.¹²⁹ It follows that conservation land uses are not economically competitive with ecologically destructive land uses, which are more attractive from the perspective of private actors in the short term; however, the loss of ES results in a greater collective cost to society, which often outweighs the private benefits by multiple factors.¹³⁰

Proponents of market environmentalism, associated with a neoliberal perspective, argue that environmental problems are best addressed via market-led capitalism. This would entail the expansion of private property rights and commodity markets. Commodification has two prerequisites: the boundaries of the commodity must be defined, and it needs to be owned, including

¹²⁷ DW Pearce and RK Turner (eds), *Economics of Natural Resources and the Environment* (John Hopkins University Press 1990).

¹²⁸ Salzman et al. supra (n 1); Pattanayak Wunder and Ferraro supra (n 61); JB Ruhl, SE Kraft and CL Lant, *The law and policy of ecosystem services* (Island Press 2007).

¹²⁹ *ibid.*

¹³⁰ See: G Hardin 'The tragedy of the commons' (1968) 162 *Science* 1243. This well-known work explains the failure of markets to promote the management of natural resources for the public good: when individual users exploit shared resources independently according to their own self-interest, their collective actions degrade those resources, eventually to the detriment of all users, because the benefits of exploiting resources accrue to individuals, while costs are dispersed.

the right to trade.¹³¹ Some argue that if environmental resources that have traditionally been regarded as public goods are commoditised, management could be achieved through market trading. In the extreme, stewardship of ES would be wholly dependent on market forces driven by self-interest and individual incentives, founded on the premise that individual property owners are better suited than government bureaucracies to manage resources.¹³²

Market failures can be addressed through a range of other approaches. Some argue that private rights should be interpreted more narrowly; that private property should be restricted according to obligations to protect the public interest in environmental resources, for example, consistent with duties for environmental stewardship.¹³³ Laws for environmental protection and natural resource management can also be viewed as interventions to correct market failures to provide for more socially optimal outcomes.¹³⁴ From a public policy perspective, governments have an essential role to play in ensuring that the public benefits of ecosystems are identified and taken into account in decisions. Government interventions can help integrate ES values into markets through a variety of mechanisms, regulations and direct spending.¹³⁵

In this context, PES is conceived as a mechanism to correct market failures associated with ecosystem services by internalizing the value of those services through direct incentives, or in some cases, through the creation of markets for ES.¹³⁶ The premise of PES is that land users can be motivated to change practices by financial incentives from those willing to pay for ES, 'internalising the externality'. Based on market theory, it is assumed this can be achieved if payments cover at minimum the income that is given up by forgoing alternative land uses ('opportunity cost').¹³⁷ PES is sometimes distinguished as either 'Coasean' ('private') or 'Pigouvian' ('public'), referring to specific underlying economic theories relating to addressing market externalities.

'Coase theorem' posits that if market trade of an externality can be established, and there are sufficiently low transaction costs, direct bargaining between buyer and sellers will lead to the

¹³¹ Vatn supra (n 45).

¹³² FL Smith 'Markets and the environment – a critical re-appraisal' (1995) 13 *Contemporary Economic Policy* 62.

¹³³ A Sandberg 'Property rights and ecosystem properties' (2007) 24 *Land Use Policy* 613; E Barritt, 'Conceptualising Stewardship in Environmental Law' (2014) 26(1) *Journal of Environmental Law* 1.

¹³⁴ Bond and Mayers supra (n 9).

¹³⁵ *The Economics of Ecosystems and Biodiversity for National and International Policy Makers – Summary: Responding to the Value of Nature* (TEEB 2009).

¹³⁶ *ibid*

¹³⁷ Engel, Pagiola and Wunder supra (n 2); Wunder supra (n 25).

optimal outcome.¹³⁸ Applying this theory to PES, private property rights would be established in units of ES, which could be commoditized for exchange. Direct negotiation of PES agreements in a free market system would then internalize ES values, resulting in the optimal levels of ES provision.¹³⁹ This theory is aligned with the perspective of neoliberalism and market environmentalism, and the conception of PES described in the Wunder (2005) definition. It suggests that by internalizing externalities, environmental considerations can be fully accounted for in the market, so that economic efficiency essentially subsumes environmental goals. Despite the dominance of the Coasean theory in economic literature on PES, it remains relatively insignificant in practice,¹⁴⁰ for a number of reasons discussed below.

'Pigouvian' economic theory posits that market failure can be addressed by government intervention to subsidize positive externalities. PES funded by government is sometimes referred to as 'Pigouvian PES' in that it resembles an environmental subsidy. The government is characterized as a third party that pays for 'bundles' of services, acting on behalf of multiple service buyers. This differs from the Coasean conceptualization primarily in that there is not a direct relationship between ES user and provider.¹⁴¹ The overwhelming majority of PES programs are implemented in the context of government-led policy, but many do not clearly fit the Pigouvian model either; a range of hybrid schemes combine various sources of funds, including from direct users of ES and governments acting on behalf of the public.¹⁴²

3.4.2 Limitations of Market Theory and the need for Governance

Models of PES based on market theory are generally not a good representation of PES in practice.¹⁴³ For example, a comprehensive review of water-related PES schemes across Latin America found that the schemes differed from PES theory in that they were: rarely designed based on economic analysis; coordinated by intermediaries; and based on agreements for changes in land management practices, rather than the exchange of ES as commodities.¹⁴⁴ PES may serve as a tool to better represent ES benefits and costs within the existing frameworks of mixed economies

¹³⁸ RH Coase 'The problem of social cost' (1960) 3 *Journal of Law and Economics* 1.

¹³⁹ Engel, Pagiola and Wunder supra (n 2).

¹⁴⁰ Schomers and Matzdorf supra (n 4).

¹⁴¹ Engel, Pagiola and Wunder supra (n 2).

¹⁴² Schomers and Matzdorf supra (n 4); Salzman supra (n 1); Wunder, Engel and Pagiola supra (n 43).

¹⁴³ J Salzman and JB Ruhl 'Currencies and the commodification of environmental law' (2000) 53 *Stanford Law Review* 607.

¹⁴⁴ J Martin-Ortega, E Ojea and C Roux 'Payments for Water Ecosystem Services in Latin America: A literature review and conceptual model' (2013) 6 *Ecosystem Services* 122.

(including markets and different spectrums of state intervention and regulation according to different jurisdictions); however, theoretical models based on pure market theory have limited applicability in this context.¹⁴⁵ There are a number of weaknesses in market theory as a theoretical foundation for PES, in particular the Coase model, which stem from weakness in market theory generally.¹⁴⁶ These critiques are reviewed below, and point to the general conclusion that governance mechanisms are needed to guide the purposeful design of PES.

New externalities. A fundamental issue is that markets can never fully take into account all environmental costs or internalize the value of all ecosystem services. Payments that internalize the value of one ES will inevitably affect other ES. There is a risk that PES could lead to unintended impacts that are not considered in the transaction – effectively creating new externalities.¹⁴⁷ Ever-expanding new markets for ES are not an appropriate response to address this; creating a new market for a particular ES does not ultimately resolve the market failure with respect to ecosystems, but merely skews it in a different direction.

Rational actors. Market theory also makes a flawed assumption that individual action is based on rational responses to economic signals; for example, that a PES incentive in an amount above opportunity cost will correlate to conservation outcomes. In reality, land use is not decided by a single actor, and decisions may not be economically rational. Land use behaviour is guided by political and legal structures as well as human values and social norms, and may change in response to several factors, only some of which can be influenced by PES incentives.¹⁴⁸

In this way, market theory cannot provide a complete theory to explain the causes of ecosystem degradation, since economic models cannot properly represent many complex factors that affect decisions impacting ecosystems.¹⁴⁹ The role of PES cannot be properly understood as a simple matter of financial incentives, but must be integrated in the context of a broader policy

¹⁴⁵ R Muradian and L Rival 'Between markets and hierarchies: The challenge of governing ecosystem services' (2012) 1 *Ecosystem Services* 93.

¹⁴⁶ GW Luck et al. 'Ethical considerations in on-ground applications of the ecosystem services concept' (2012) 62(12) *BioScience*, 1020; N Kosoy and E Corbera 'Payments for ecosystem services as commodity fetishism' (2010) 69 *Ecological Economics* 1228; Van Hecken and Bastiaensen supra (n 46).

¹⁴⁷ Engel supra (n 36); KMA Chan supra (n 68); Muradian et al. supra (n 20).

¹⁴⁸ Bond and Mayers supra (n 9); V Kolinjivadi, J Adamowski and N Kosoy 'Recasting payments for ecosystem services (PES) in water resource management: A novel institutional approach' (2014) 10 *Ecosystem Services* 144.

¹⁴⁹ Engel supra (n 36); Muradian et al. supra (n 20).

approach.¹⁵⁰ In many contexts, PES incentives will be inadequate on their own to change behaviour and may need to operate in tandem with regulation or other strategies.¹⁵¹

Lack of demand and coordination of actors. Another reason why the theory of Coasean negotiation between ES providers and beneficiaries is not reflected practice is because the transaction costs of negotiation can be high.¹⁵² High transaction costs can result from a number of factors, including the initial challenge of acquiring the information needed to identify ES providers,¹⁵³ and the difficulties of negotiating multiple contracts where many providers may be needed to secure ES.¹⁵⁴ Information must be sufficient for parties to be satisfied that the terms of a PES agreement represent a fair exchange,¹⁵⁵ but there may be high costs involved in the assessment and monitoring of ES, and in monitoring to verify the activities of ES providers, which may be beyond the capacity of individual ES buyers.¹⁵⁶

There are also limited scenarios where a defined number of beneficiaries or users can be identified as having a high portion of the total benefits from ES.¹⁵⁷ Since many ES benefit the public at large, individual users may be reluctant to pay more than their perceived fair share; this may require a mechanism to coordinate collective contributions to PES.¹⁵⁸ ES users may also be unaware of the links between ecosystems and their interests.¹⁵⁹ In many cases, PES schemes are supported by awareness-raising by intermediaries.¹⁶⁰ Furthermore, ES users and ES providers often lack the capacity to independently connect with each other and organise agreements, and the logistical barriers to doing so can entail transaction costs that make PES infeasible.¹⁶¹ High transaction costs have a significant limiting effect on the capacity of the end users of ES to initiate PES schemes,¹⁶² and existing PES programs have identified that capacity to organise transactions is a key barrier to scaling up.¹⁶³ Successful PES requires low-transaction-cost institutions to provide an

¹⁵⁰ Van Hecken and Bastiaensen supra (n 46).

¹⁵¹ Salzman et al. supra (n 1).

¹⁵² Engel supra (n 36); Tacconi supra (n 20).

¹⁵³ Reid and Nsoh supra (n 57).

¹⁵⁴ Tacconi supra (n 20).

¹⁵⁵ Reid and Nsoh supra (n 57).

¹⁵⁶ Tacconi supra (n 20).

¹⁵⁷ Tacconi supra (n 20); Engel supra (n 36).

¹⁵⁸ Bond and Mayers supra (n 9); Tacconi supra (n 20); Engel supra (n 36).

¹⁵⁹ E Corbera and H Schroeder 'Governing and implementing REDD+' (2011) 14(2) *Environmental Science Policy* 89.

¹⁶⁰ Defra supra (n 15); Bond and Mayers supra (n 9).

¹⁶¹ Tacconi supra (n 20); Engel supra (n 36).

¹⁶² Tacconi supra (n 20).

¹⁶³ Bennett and Ruef supra (n 10).

efficient means of exchange to collect and distribute funds.¹⁶⁴ In practice, governments or NGOs acting in the public interest are often needed to organize payments and set prices, in particular to facilitate (or mandate) the demand side.¹⁶⁵ More thorough and precise design of PES may create overly burdensome transaction costs, compared to a relatively simple system that can be implemented more quickly and cost effectively.¹⁶⁶

Commodification. The Coasean ideal of PES has also been widely criticized because commodification it is inconsistent with the natural features of ecosystems; ecosystem functions are inextricably linked, producing interrelated ES that cannot be compartmentalized into discrete units for trading.¹⁶⁷ ES itself cannot be easily exchanged in the market:

*Ecosystem services are not like other goods or services that move through our economy. They cannot be easily separated from their ecosystem bases, or moved around and delivered the way around the way other raw materials or services are physically distributed.... [they are] ecologically, geographically, and economically more complex than any other kind of commodity or service.*¹⁶⁸

The transformation of ES into trading commodities would necessitate narrowing down an ecological function to a specific ecosystem service, and assigning a single-exchange value to this service.¹⁶⁹ It is argued that this process dangerously oversimplifies the complex underlying social, political and biophysical relationships between humans and the environment.¹⁷⁰ Furthermore, as discussed in Chapter 2, some argue against the commodification of ecosystems on ethical grounds, and outright reject economics as a utilitarian rationale for conservation.¹⁷¹

‘Fungibility’ is a fundamental notion that facilitates trade by converting items into a common currency, where any individual unit is considered to be the same as any other unit, allowing free substitution of one thing with another. This presents challenges in the case of ecosystems, habitats, biodiversity, and even individual representatives of a species, where each is

¹⁶⁴ Salzman et al. supra (n 1).

¹⁶⁵ Vatn supra (n 45).

¹⁶⁶ Reid and Nsoh supra (n 57); Engel supra (n 36); Tacconi supra (n 20).

¹⁶⁷ D Goble, ‘What are Slugs Good for? Ecosystem Services and the Conservation of Biodiversity’ (2007) 22(2) *Journal of Land Use* 411; E Gomez-Baggethun and M Ruiz-Perez ‘Economic valuation and the commodification of ecosystem services’ (2011) 35(5) *Progress in Physical Geography* 613; Van Hecken and Bastiaensen supra (n 46); Vatn supra (n 45).

¹⁶⁸ Ruhl, Kraft and Lant, supra (n 129), 9.

¹⁶⁹ Gomez-Baggethun and Ruiz-Perez supra (n 168).

¹⁷⁰ Kosoy and Corbera supra (n 147); Gomez-Baggethun and Ruiz-Perez supra (n 168); RB Norgaard ‘Ecosystem services: From eye-opening metaphor to complexity blinder’ (2010) 69 *Ecological Economics* 1219.

¹⁷¹ Gomez-Baggethun and Ruiz-Perez supra (n 168).

unique and cannot be exactly substituted by another. Ecosystem services are distinguishable from many fungible economic goods because they are intertwined with one another and are produced from complex relations between interacting ecosystem processes and components.¹⁷² In limited cases, such metrics for ES have been feasible where services are fungible, such as carbon offset credits that are equivalent to one tonne of CO₂-equivalent emissions.¹⁷³ However, offset schemes become more controversial when dealing with habitat and biodiversity in terms of how to measure the value of one 'unit' of ES against another.¹⁷⁴

Non-fungibility in relation to the environment can be identified in terms of space, of type and of time.¹⁷⁵ In terms of space, two sites of the same size and ecosystem type are non-fungible because of the complexity of ecosystems and variations in their location, relationship to other sites, and their specific composition of species and individuals. In terms of type, one ecosystem or habitat type cannot be substituted by another (with ES provided by forests, for instance, being very different from ES provided by coastal habitats). In terms of time, consideration must be given to the time needed to establish populations of species, habitats and interactions within an ecosystem, in particular where offsetting schemes seek to substitute destroyed habitat with restored habitat. While elements of space, type and time can be taken into account to approximate 'units' in relation to ecosystems, ethical considerations remain, related to the intrinsic value of a particular space, species or individual, which cannot be substituted.¹⁷⁶

'Compliance market' trading and offset schemes are applied within a regulatory framework, and the commodification and trade of ES is unlikely to emerge in the absence of such a framework. Apart from the offset context, there are some examples of 'ES certificates' being used as a metric to attract voluntary private investment in PES (mainly on the basis of corporate social responsibility), such as in the Costa Rican example that will be explored in Chapter 4. Similarly, in Malaysia, the state government worked with private parties to restore rainforest habitat, and sold 'biodiversity conservation certificates' representing 100 square meters of forest restoration and protection, with

¹⁷² Reid and Nsoh supra (n 57); E Gómez-Baggethun and R Muradian 'In Markets We Trust? Setting the Boundaries of Market-Based Instruments in Ecosystem Service Governance (2015) 117 *Ecological Economics* 217.

¹⁷³ Salzman supra (n 1).

¹⁷⁴ Reid supra (n 117); Reid and Nsoh supra (n 57); Salzman and Ruhl supra (n 144); M Maron et al. 'The many meanings of no net loss in environmental policy' (2018) 1 *Nature and Sustainability* 19.

¹⁷⁵ Salzman and Ruhl supra (n 144).

¹⁷⁶ Salzman and Ruhl supra (n 144); Reid and Nsoh supra (n 57).

measures in place to ensure protection for at least 50 years.¹⁷⁷ However, the use of this type of unit for exchange does not entail the commodification of ES; as will be discussed in section 4.5.1, legal frameworks generally do not support the recognition of private property rights in ES, which would be required for the exchange of ES in Coase-like direct deals.

Coordination of ES. In order for PES to achieve meaningful benefits in the provision of ES, the impacts of individual PES agreements must combine to support ecosystem processes that operate at larger temporal and spatial scales. Case studies have identified collective action as an important factor in the success of PES schemes; land management interventions that are coherently targeted and planned will achieve greater impacts than measures implemented in a scattered and ad hoc fashion. In the case of protecting water resources, coordination and collective engagement of landholders in the watershed is needed to reach a ‘critical mass’ in order for measures to have the desired impacts.¹⁷⁸ Reliance on the independent negotiation of ES users and ES providers is generally insufficient to provide for this, and can exacerbate the concerns discussed in Chapter 2 respecting ecosystem management that focuses on the provision of a single ES.

The question of how to coordinate the provision of ES is relevant to the design of PES by applying ‘bundling’ or ‘layering’. Layering would be the preferred method according to economic theory, where markets for each ES would result in an efficient outcome for provision of that ES. However, this approach can exacerbate concerns related to the limitations of markets to provide for appropriate governance of ES. Challenges related to transaction costs and administrative burden, for instance, can be multiplied with the implementation of multiple independent markets.¹⁷⁹ On the other hand, where there are multiple buyers with very different interests, layered schemes may be able to tailor marketing to specific buyers more effectively than bundled schemes, and obtain more funding overall.¹⁸⁰

Bundling can provide a way to reduce transaction costs, by operating a single payment scheme with multiple benefits, and pooling sources of funds that are administered under one scheme. Bundled PES schemes can also be designed more holistically, taking into account

¹⁷⁷ Salzman et al. supra (n 1).

¹⁷⁸ Bond and Mayers supra (n 9); Smith, L ‘United Kingdom case study - Payments for ecosystem services (PES) and collective action - Upstream Thinking in the South West of England’ in OECD (ed) *Providing Agri-environmental Public Goods through Collective Action* (OECD Publishing 2013).

¹⁷⁹ Banerjee supra(n 82); Engel 2016; DEFRA Best Practices Guide.

¹⁸⁰ Banerjee supra (n 82).

interactions among ES, as compared to layered schemes.¹⁸¹ There is some concern that bundled PES schemes are more susceptible to a lack of additionality – where payments made for just one ES would have resulted in the provision of multiple ES without additional payments. On the other hand, failure to pay for multiple services can result in insufficient incentive to provide even one service, and bundling can help to achieve a payment level high enough to cover ES provision costs.¹⁸²

Coordination and integration can also be supported by the involvement of public interest actors (governments or NGOs) to design PES based on criteria that requires consideration of multiple ecosystem attributes and trade offs between multiple stakeholders.¹⁸³ Some commentators have also argued that efforts to determine ‘additionality’ in ES provision gained at the level of individual participants should be abandoned, with a focus instead on benefits gained from the coordinated impacts of PES schemes as a whole.¹⁸⁴ This broad, public interest, view of additionality would consider the “difference between the gross welfare effects induced by the scheme on society (...) and the total cost incurred to implement it”.¹⁸⁵

Equity. Models of PES that rely on individual negotiation also raise equity concerns that those with purchasing power will have greater access to ES. On the side of ES providers, there are equity concerns in the determination of who is eligible to receive payments. Where economic efficiency is paramount, PES may neglect procedural fairness and consideration of the equitable distribution of project outcomes.¹⁸⁶ Where schemes include dual goals of securing ES benefits and poverty alleviation, there can be tensions between targeting the most ecologically important land and consideration of participant welfare.¹⁸⁷ Strategies to reduce PES transaction costs might also include targeting larger parcels of land over many smaller-scale providers, which generally favours wealthier landholders. In many cases, transaction costs are the main barriers to participation of

¹⁸¹ Banerjee supra (n 82); Engel 2016; Defra supra (n 15).

¹⁸² *ibid.*

¹⁸³ KMA Chan et al. supra (n 68); See also research that supports the consideration of ‘bundles’ of ES: C Raudsepp-Hearne, GD Peterson and EM Bennett ‘Ecosystem service bundles for analyzing tradeoffs in diverse landscapes’ (2010) 107(11) *Proceedings of the National Academy of Sciences of the United States of America*, 5242.

¹⁸⁴ KMA Chan et al. supra (n 68).

¹⁸⁵ U Pascual et al. ‘Exploring the link between equity and efficiency in payments for environmental services: A conceptual approach’ (2010) 69 *Ecological Economics* 1237, 1239.

¹⁸⁶ Norgaard supra (n 122); Kosoy and Corbera supra (n 147); Gomez-Baggethun and Ruiz-Perez supra (n 168).

¹⁸⁷ Pascual et al. supra (n 186).

poor landholders in PES.¹⁸⁸ PES design can be adapted to reduce barriers to participation for poor ES providers, for example by allowing group applications, lowering requirements on proof of formal title, and supporting poor landholders through capacity building and technical assistance.¹⁸⁹

In practice, research has provided mixed results regarding the positive impacts of PES on social welfare, while there is little evidence of PES doing any harm.¹⁹⁰ Some studies of the impact of PES on poverty have concluded that while PES is not the most effective way to directly address poverty (compared to approaches such as improving education, access to health services and nutrition), there are significant and positive indirect effects of PES on social welfare. Consideration of social welfare factors in targeting for payments can make PES programmes more effective at alleviating poverty.¹⁹¹

Governance of PES. Many authors have pointed to the need for appropriate institutional and governance frameworks to align PES with the public interest in protecting ecosystems and broader sustainability objectives, and also the need to integrate PES within existing frameworks for environmental protection, conservation and natural resource management.¹⁹² PES is better understood as a tool within this context, rather than a market-based alternative to governance. Some commentators have observed that policy agendas around ES have “shifted the emphasis from getting the right governmental regulation for conservation to getting the right price for ecosystem services.”¹⁹³ This has resulted in polarising debates that present a false dichotomy, whereas a combination of approaches might be most suitable to deal with the complex governance challenges related to ES. It is argued that economic incentives may contribute to improvements in the provision of ES, but only if rules are in place to guide its design and implementation.¹⁹⁴

¹⁸⁸ Pagiola, Arcenas and Platais supra (n 43); Bond and Mayers supra (n 9).

¹⁸⁹ Engel supra (n 36).

¹⁹⁰ I Porras and N Asquith, ‘Chapter 13: Scaling-up conditional transfers for environmental protection and poverty alleviation’, in K Schreckenberg, G Mace and M Poudyal (eds) *Ecosystem services and poverty alleviation: Trade-offs and governance* (Routledge 2018); M Richards, *What Do We Know about Gender and Other Social Impacts of IWS Projects? A Literature Review* (Forest Trends 2013); Pattanayak, Wunder, and Ferraro supra (n 61).

¹⁹¹ Bond and Mayers supra (n 9).

¹⁹² Reid supra (n 117); KMA Chan et al. supra (n 68); Kolinjivadi, Adamowski and Kosoy supra (n 134); Gómez-Baggethun and Muradian supra (n 173); G Van Hecken and J Bastiaensen ‘Payments for Ecosystem Services in Nicaragua: Do Market-Based Approaches Work?’ (2010) 41 (3) *Dev. Change* 421; R Brouwer ‘Payments for Ecosystem Services’ in M Potschin et al. (eds) *Routledge Handbook of Ecosystem Services* (Routledge 2016); Banerjee supra (n 82).

¹⁹³ R Muradian and Rival supra (n 146), 93.

¹⁹⁴ Muradian and Rival supra (n 146).

Some argue that government intervention in PES to consider social welfare and broad policy objectives is inefficient and hampers market forces that are best suited to direct the allocation of ES resources: “schemes can become overloaded with side objectives catering to voters rather than supplying ecological services proper”.¹⁹⁵ However, these ‘side objectives’ can also be understood as the result of legitimate, democratic political and legal processes that should legitimately influence priorities for ES protection. Traditional markets are not an appropriate mechanism for determining which ecosystem services are protected, and how they are allocated, especially given the inherent value of ecosystems and the public interest nature of the benefits they provide.¹⁹⁶

Furthermore, oversimplified economic models are unlikely to be helpful in addressing complex ecosystem management issues; PES design based on Coase theory assumes a “two-party negotiation solution in a world where two-party problems are rare.”¹⁹⁷ An approach to PES primarily concerned with economic efficiency is ultimately “limited in scope and not very useful.”¹⁹⁸ Ultimately:

*The question is whether the establishment of PES will provide additional social and environmental benefits at an acceptable cost. We need to remain focused on the large picture. The end goal is not market creation, but sustainable development. Consequently, PES should not be seen as an end in itself, but rather as a specific policy tool to be handled with care and applied where it can deliver the desired results.*¹⁹⁹

3.4.3 Policy Rationale for Payments for Ecosystem Services

Given that governments often lead or facilitate PES in practice, the design of PES is heavily influenced by political structures.²⁰⁰ However, the examination of PES design from the perspective of political decision-making is not as well explored in the literature as economic perspectives. The success of PES schemes as policy tools depends on their public legitimacy. This requires demonstrating the public benefit resulting from PES, and general acceptance that private parties ought to be compensated for the provision of that benefit. PES design requires careful consideration of the distribution of public and private benefits that result from which ES are

¹⁹⁵ Wunder supra (n 25), 8.

¹⁹⁶ Costanza supra (n 33); Reid supra (n 117).

¹⁹⁷ KMA Chan et al. supra (n 68).

¹⁹⁸ Muradian et al. supra (n 20).

¹⁹⁹ Smith et al. supra (n 9).

²⁰⁰ D Hausknot, N Grima and SJ Singh ‘The political dimensions of Payments for Ecosystem Services (PES): Cascade or stairway?’ (2017) 131 *Ecological Economics* 109.

targeted and which parties directly participate in PES arrangements.²⁰¹ Perceptions about the legitimacy or fairness of PES may also affect compliance with environmental laws in general.²⁰²

PES compared to regulatory measures. Traditional approaches to environmental protection have relied mainly on ‘command and control’ mechanisms, which establish a legal norm (such as an effluent standard), coupled with a sanction for non-compliance. These types of controls have been effective in controlling pollution from well-defined point sources, such as factories or sewage treatment plants, which can be identified, regulated, and monitored. However, command and control approaches are less effective in regulating non-point sources of pollution and other types of environmental degradation that are the result of the cumulative effects of many actors, where it is difficult to attribute impacts to a specific actor.²⁰³

For example, forestry, agriculture, residential and recreational land users may create downstream water pollution, alter water flows, and negatively impact biodiversity, but because these impacts occur incrementally across the landscape it is difficult to measure the impact of a specific land user. Diffuse pollution such as urban storm water runoff, run-off from fields, or seepage of nutrients into groundwater may be negligible at the level of individual properties, but have significant aggregate impact upon water quality at the watershed scale. Regulations can also be difficult and costly to enforce in rural areas.²⁰⁴ There may also be scenarios where the regulation of activities may not be politically or legally acceptable, where it is seen as infringing on the rights of landowners.²⁰⁵ Advocates of PES argue that it can be more flexible, cost-efficient and effective than a command and control approach in improving the provision of ES.²⁰⁶

Rewarding stewardship or paying polluters? PES should not be a substitute for the ‘polluter pays principle’ whereby polluters should bear the cost of pollution, and of compliance with regulatory obligations.²⁰⁷ This is closely linked with the concept of ‘additionality’: that payments should only be made for actions over-and-above those that are usually required. The key question is how to determine a ‘zero reference’ starting point, which will ultimately inform who should pay

²⁰¹ S Lockie ‘Market instruments, ecosystem services, and property rights: Assumptions and conditions for sustained social and ecological benefits’ (2013) 31 *Land Use Policy* 90.

²⁰² Pascual et al. supra (n 186).

²⁰³ OECD supra (n 179); Bennett and Ruef supra (n 10); Ruhl, Kraft and Lant, supra (n 129).

²⁰⁴ *ibid.*

²⁰⁵ Van Hecken and Bastiaensen supra (n 46).

²⁰⁶ Greiber supra (n 5); Ruhl, Kraft and Lant supra (n 129); KMA Chan et al. supra (n 68); Engel supra (n 36).

²⁰⁷ Defra supra (n 15); KMA Chan supra (n 68); Engel supra (n 36).

for ES: the ES user based on PES, or the ES provider based on a duty not to degrade ES and the polluter pays principle. This depends on expectations of private property rights, and social norms. The shift towards viewing landholders as service providers rather than polluters is not politically neutral. Furthermore, the fundamental qualification of a certain impact as either a positive or negative externality is inherently a normative process. This involves an important political choice, which some commentators urge should be debated more transparently, rather than obscured by a technical framing of the issue as one of matching supply and demand.²⁰⁸

There are concerns that PES sends an implicit signal that people have the right to degrade unless paid not to do so (hence ‘polluter is paid’ rather than ‘steward earns’).²⁰⁹ Furthermore, PES may not be seen as legitimate if it is interpreted as the political incapacity of government to enact or enforce adequate environmental regulations. Concerns that PES rewards polluters are amplified if environmental laws are not in place, or underlying governance issues such as corruption or poor enforcement of environmental laws are not addressed.²¹⁰ A study in the UK has identified that high levels of baseline compliance with regulations is an important prerequisite for successful PES, in order to avoid concerns about rewarding polluters.²¹¹ PES may also be viewed as the channeling of wealth to private interests, rather than as a fair and reasonable measure that increases the capacity of private parties to participate in protecting ecosystems in the public interest.²¹²

Stewardship is a concept in environmental law scholarship that considers the relationship between humans and the natural environment from the perspective of duties owed, to nature itself and to present and future generations. It has been used to reconceive the proprietary relationship with land, away from the typical focus on rights, towards imposing burdens on landowners to be good land stewards. The state is positioned as having the responsibility to establish, promote and enforce standards of conduct, through regulatory and other measures. It has been argued that stewardship duties are not only ethical duties but also legal duties, which should be interpreted to place limitations on existing property rights (thereby raising the bar for the ‘zero reference’ point and bringing into question the legitimacy of PES).²¹³ However, where stewardship is not a legal

²⁰⁸ Van Hecken and Bastiaensen *supra* (n 46).

²⁰⁹ Gomez-Baggethun and Ruiz-Perez *supra* (n 168).

²¹⁰ Lockie *supra* (n 202); Bond and Mayers *supra* (n 9).

²¹¹ OECD *supra* (n 179).

²¹² Lockie *supra* (n 202).

²¹³ Barritt *supra* (134).

duty, PES can be considered a means to promote good stewardship beyond what might be legally enforceable.²¹⁴

While it is generally accepted that industrial activities are subject to government regulation, this is less clear for activities related to food production, forestry, hunting, fishing, domestic and recreational uses.²¹⁵ Proponents of the PES approach emphasize that it is unsustainable, inefficient and unfair from a social welfare perspective to place the burden of conservation entirely on land users. The relative income level and social status of ES users and ES providers is relevant to this consideration, and PES may be more appropriate when ES users are relatively well off compared to ES providers.²¹⁶ In the context of developing countries, some authors have observed that any strategies for the conservation of natural capital must provide alternative development opportunities for ES providers. PES is considered one type of mechanism that can work towards that balance. There may also be additional considerations where Indigenous peoples have protected rights to certain land uses.²¹⁷

Impact of incentives on social norms. PES itself may shift social norms respecting the rights and responsibilities towards ecosystems.²¹⁸ The introduction of incentive programs into a community setting can have unintended ethical and social implications.²¹⁹ In particular, there is a risk that the use of payments to prevent environmental degradation will change the perception that damaging activities are considered wrongful; PES may ‘crowd-out’ intrinsic motivations to protect the environment.²²⁰ Essentially, it is argued that paying parties to ‘do what is right’ has the risk of diluting the norms and undermining existing ‘altruistic motivations.’²²¹ Moreover, payments may

²¹⁴ KMA Chan supra (n 67),

²¹⁵ Van Hecken and Bastiaensen supra (n 46).

²¹⁶ Kosoy and Corbera supra (n 147); Engel supra (n 36); Van Hecken and Bastiaensen supra (n 46).

²¹⁷ Van Hecken and Bastiaensen supra (n 46); Willaarts et al. supra (n 23).

²¹⁸ A Solazzo, A Jones and N Cooper ‘Revising payment for ecosystem services in the light of stewardship: The need for a legal framework’ (2015) 7(11) *Sustainability*, 15449; V Mauerhofer, K Hubacek and A Coleby ‘From polluter pays to provider gets: Distribution of rights and costs under payments for ecosystem services’ (2013) 18(4) *Ecology and Society* 41; KMA Chan, T Satterfield and J Goldstein ‘Rethinking ecosystem services to better address and navigate cultural values’ (2012) 74 *Ecological Economics* 8; Reid supra (n 117).

²¹⁹ JS Brooks, KA Waylen, and MB Mulder ‘How national context, project design, and local community characteristics influence success in community-based conservation projects’ (2012) 109(52) *Proceedings of the National Academy of Sciences of the United States of America* 21265; Luck et al. supra (n 147).

²²⁰ J Rode, E Gómez-Baggethun and T Krause ‘Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence’ (2015) 117 *Ecological Economics* 270; Kosoy and Corbera supra (n 147); Vatn supra (n 45).

²²¹ Luck et al. supra (n 147); Ruhl, Kraft and Lant, supra (n 129); Vatn supra (n 45).

create a moral hazard or perverse incentive, where ES providers may intentionally do what is 'wrong' in order to set up the case for receiving payment.²²²

However, evidence from behavioural economics and psychology is mixed. There is also some evidence that PES can reinforce non-economic motivations for conservation, thus 'crowding in' participant motivations.²²³ In this way, PES payments function as a nudge to translate existing motivations for conservation into actions.²²⁴ One study of the impacts of PES on social norms and behavior found that introducing a financial incentive for behaviour change can continue to positively influence behavior even after incentives have ended, suggesting that PES can have a role in evoking and shifting norms in favour of conservation over the long term.²²⁵ Furthermore, PES may positively influence norms by combining incentives with support networks, peer-to-peer advice, and collective monitoring that can advance best practices.²²⁶ Some studies of participant motivations in successful PES schemes have concluded that financial incentives were not the primary reason for the scheme's success. Rather, payments in combination with education and technical support, through a long-term participatory process, were critical to securing a commitment to changed practices on the part of landholders.²²⁷

Some argue that the potential perverse consequences of PES can be avoided where payments are clearly lower than opportunity costs, because ES providers must retain intrinsic motivations to justify participation.²²⁸ However, the majority of the studies on the behavioural economics of PES specifically focus very broadly on the comparison of payments to no payments.²²⁹ Further research on behavioural economics in context-specific applications would be helpful.²³⁰ There is also room for multiple approaches that balance social duties, due diligence, and legal

²²² Ruhl, Kraft and Lant, *supra* (n 129); Sommerville, Jones and Milner-Gulland *supra* (n 29); Wunder, Engel and Pagiola *supra* (n 43).

²²³ Rode, Gómez-Baggethun and Krause *supra* (n 221); KMA Chan et al. *supra* (n 68); T Cody 'Sliding-scale environmental service payments and non-financial incentives: Results of a survey of landowner interest in Costa Rica' (2016) 130 *Ecological Economics* 252; L Morosa, MA Vélez, E Corbera 'Payments for Ecosystem Services and Motivational Crowding in Colombia's Amazon Piedmont' (in press, accepted December 2017) *Ecological Economics* <<https://doi.org/10.1016/j.ecolecon.2017.11.032>> accessed 20 May 2018.

²²⁴ KMA Chan et al. *supra* (n 68).

²²⁵ JM John et al. 'Long-Term Effects of Payments for Environmental Services: Combining Insights from Communication and Economics' (2017) 9 *Sustainability* 1627.

²²⁶ OECD *supra* (n 179).

²²⁷ Perrot-Maître *supra* (n 99).

²²⁸ KMA Chan et al. *supra* (n 68); N Kosoy et al. 'Payments for environmental services in watersheds: Insights from a comparative study of three cases in Central America' (2007) 61 *Ecological Economics* 446.

²²⁹ Rode, Gómez-Baggethun and Krause *supra* (n 221).

²³⁰ Engel *supra* (n 36).

standards with positive incentives that recognize the role of ES providers and demand some contribution from ES users.²³¹ Distributing rights and responsibilities and the burden of payments across multiple actors is more conducive to sustainability.²³² While PES focuses on rewarding positive externalities, it can be designed in tandem with the mechanisms that internalise negative externalities (consistent with the polluter pays principle).

3.5 Legal Frameworks for Payments for Ecosystem Services

3.5.1 Background Legal Frameworks for Payments for Ecosystem Services

PES schemes operate in the context of wide range of different legal frameworks, with varying degrees of government intervention and PES-specific legislation and policy. In most cases, PES has been established through ad-hoc programmes or projects, in the absence of any laws specifically dealing with PES.²³³ The discussion below highlights some of the key features of the general law, or overarching ‘background’ legal framework, that are relevant to the design and administration of PES.

Contract law. PES arrangements between two independent parties require no legal preconditions beyond basic contract law.²³⁴ The contractual relationship between parties in a PES arrangement is the most direct legal framework for PES; the terms and conditions in PES contracts determine the specific obligations of the parties with respect to each other, including actions to protect or enhance ES.²³⁵ In this way, the criteria of ‘conditionality’ for PES is established via contracts, which must clearly stipulate what is required and how compliance will be measured. Stable and enforceable contract law that supports the enforcement of PES contracts is critical.²³⁶ Even where PES-specific laws exist to guide the administration and design of PES (including, in some cases, setting out the content of standard contract terms), the contract itself remains the direct legal arrangement for PES implementation.

²³¹ Van Hecken and Bastiaensen supra (n 46).

²³² KMA Chan et al. supra (n 68).

²³³ Greiber supra (n 5); Willaarts et al. supra (n 23).

²³⁴ Greiber supra (n 5).

²³⁵ Engel, Pagiola and Wunder supra (n 2); Greiber supra (n 5).

²³⁶ Greiber supra (n 5); Engel supra (n 36); Willaarts et al. supra (n 23); Wunder supra (n 4); G Scheufelea, H Smith, and X Tsechalicha, *The Legal Foundations of Payments for Environmental Services in Lao PDR*, (Australian Centre for International Agricultural Research 2015).

Another critical threshold condition for PES is the absence of any legal provisions that prohibit PES schemes.²³⁷ One commonly cited example is article 74 of Ecuador's constitution, which states that ecosystem services are not 'susceptible to appropriation' and that the production, provision and use of ES will be regulated by the national government.²³⁸ This is generally taken to mean that independent parties cannot enter into PES arrangements without additional clarification or regulation from the national government to allow PES.²³⁹ Such a prohibition is rare, since the laws of most jurisdictions do not deal explicitly with ES at all. Government agencies or regulated entities may be limited in their ability to participate in PES if it is not explicitly within the scope of their mandate or permitted spending, or there may be limitations on their ability to pool funds with other parties – such as the example of water funds discussed above.²⁴⁰ PES agreements are also constrained in that they cannot directly conflict with the general law; parties cannot agree to land management activities that would transgress and requirements set by laws for environmental protection, natural resource management and land use planning. This does not mean, however, that independent PES agreements would necessarily be well coordinated with these regimes.

Land tenure. Property rights determine in large part which parties are legally in a position to affect land use and thereby impact the provision of ES.²⁴¹ Clear and secure land tenure and property rights are also frequently identified as critical threshold conditions for successful implementation of PES. Otherwise, multiple parties with competing interests in land can make the negotiation of PES agreements unworkable and PES contracts may be impossible to enforce.²⁴² Particularly in developing countries, in order to provide both positive environmental and social benefits, successful PES schemes must often be accompanied by steps to secure land tenure for poor, rural and Indigenous communities.²⁴³

'Baseline' environmental protection. As discussed above, the distribution of property rights, and constraints on property rights imposed by laws for environmental protection and the

²³⁷ Greiber supra (n 5); Wunder supra (n 4); S Hawkins, *Laying the Foundation: An Analytical Tool for Assessing Legal and Institutional Readiness for PES* (Forest Trends 2011).

²³⁸ Constitution of the Republic of Ecuador of 2008 (translated by Political Database of the Americas, Georgetown University), Art. 14.

²³⁹ Hawkins supra (n 238).

²⁴⁰ Bennett and Ruef supra (n 10).

²⁴¹ Sandberg supra (n 119); C Reid and W Nsoh 'Whose ecosystem is it anyway? Private and public rights under new approaches to biodiversity conservation' (2014) 5(2) *Journal of Human Rights and the Environment* 112.

²⁴² Greiber supra (n 5); Hawkins supra (n 238); Wunder supra (n 4).

²⁴³ Bond and Mayers supra (n 9).

management of land and natural resources, also informs the baseline for when PES is considered justified in rewarding stewardship. The distribution of rights and duties with respect to ES shifts the underlying rationale for PES in terms of who is considered an ES user and provider, the objectives of the PES arrangement and how this fits within the general law.²⁴⁴ Constitutional rights to a healthy environment may be an important factor: globally, over 177 countries, including most countries in Latin America, explicitly recognize a right to an ‘ecologically balanced’ or ‘healthy’ environment, and an explicit or implicit duty on the state to preserve it.²⁴⁵ These rights link environmental conditions to human conditions, which is consistent with the ES concept. Interpreted through the lens of ES, rights might be interpreted to mean a certain threshold level of services must be maintained. If government has a corresponding duty to take measures to ensure that level of ES, those measures might include PES.²⁴⁶

Property rights in ES. The ES concept and PES schemes also raise novel legal issues around property rights and responsibilities with respect to ecosystems.²⁴⁷ An ecosystem itself is not something that can be owned in its entirety; rather, a complex mix of rights to land and resources apply to components within an ecosystem.²⁴⁸ Property rights can be understood in western societies as a ‘bundle’ of rights that together constitute ‘ownership rights’.²⁴⁹ With respect to land, these include:

- Access and use rights, which give the right to access land, including in order to use natural resources located on the land;
- Control rights, which give the right to make decisions how the land and its natural resources are used; and
- Transfer rights, which give the right to sell, to convey or to mortgage the land to others through contracts, to transmit the land through inheritance, including allocating certain access, use and control rights.

Importantly, rights to certain resources are often decoupled from rights to land itself. For example, distinct property rights commonly exist in water, wildlife and mineral resources; often, ‘ownership’

²⁴⁴ Engel supra (n 36); Muradian et al. supra (n 20); Gomez-Baggethun and Ruiz-Perez supra (n 168); Reid supra (n 117); KMA Chan et al. supra (n 68).

²⁴⁵ D Boyd, *The Environmental Rights Revolution* (UBC Press 2012); Willaarts et al. supra (n 23).

²⁴⁶ Van Hecken and Bastiaensen supra (n 46).

²⁴⁷ Reid and Nsoh, supra (n 242); Reid and Nsoh supra (n 57).

²⁴⁸ Sandberg supra (n 119).

²⁴⁹ Sandberg supra (n 119).

of these resources is reserved by the state, with recognized private or public rights of access and use.²⁵⁰

While property rights regimes differ between jurisdictions, private rights are generally limited by principles of non-interference with other private rights or public rights and laws imposed by government in the public interest. The concept of ES may influence the interpretation of rights with respect to components of ecosystems and may entail new duties (e.g., not to interfere with the provision of ES).²⁵¹ For example, some research has explored the concept of stewardship as it might relate to PES and proposed that underlying stewardship duties should be interpreted as a type of liability to ensure that PES does not infringe on the public interest in ecosystems.²⁵² ES may also influence the extent to which the state is considered justified in restricting, or even taking over through expropriation, these rights in order to conserve and protect ecosystems in the public interest.²⁵³

Approaches to PES that purport to commoditize ES for purchase and sale, consistent with the Coase theory discussed above, also raise questions about whether private property rights can be recognized in “units” of ES. For PES transactions that entail the transfer of credits for ES, this may be interpreted as requiring the legal recognition of rights in ES itself, as a type of intangible good that can be transferred separately from the land generating the ES.²⁵⁴ Emissions trading regimes, for example, have raised complex debates about who owns “carbon rights”, including the right to claim credits generated from carbon sequestered by land,²⁵⁵ as well as questions around whether carbon credits themselves represent a form of property.²⁵⁶ As discussed below, some laws are beginning to directly address the issue of ES and eligibility to receive payments for ES. In the absence of such clarity, rights to ES might be assumed to belong to landowners as part of rights to land, holders of rights to natural resources on the land (e.g. timber rights) or the state on behalf of the general public.²⁵⁷

²⁵⁰ Ruhl, Kraft and Lant, supra (n 129).

²⁵¹ Ruhl, Kraft and Lant, supra (n 129); Reid supra (n 117).

²⁵² Solazzo, Jones and Cooper supra (n 190).

²⁵³ Reid and Nsoh supra (n 242); Reid and Nsoh supra (n 57).

²⁵⁴ Hawkins supra (n 238).

²⁵⁵ A Karsentya, A Vogel and F Castell “Carbon Rights”, REDD+ and Payments for Environmental Services’ (2014) 35 *Environmental Science & Policy* 20.

²⁵⁶ J Monterubio ‘Recognition of Property Rights in Carbon Credits Under California’s New Greenhouse Gas Cap-and-Trade Program’ (2012) 12(2) *Sustainable Development Law & Policy* 64.

²⁵⁷ Hawkins supra (n 238).

In most cases, however, payments are not structured as an exchange of 'ES' itself. Rather, payments are based on an agreement to take, or refrain from taking, certain actions associated with the conservation and restoration of natural ecosystems. The ES provider must have the corresponding property rights to exercise the required control over land and resources, but these agreements can be made without transferring any rights or resources, and without needing to distinctly recognize rights to ES. For example, PES to protect hydrological ecosystem services do not entail the transfer of water rights, and biodiversity offset payments do not transfer rights to species or genetic resources.²⁵⁸

3.5.2 Legal Frameworks Specific to Payments for Ecosystem Services

Legal frameworks specific to PES remain relatively uncommon. It has been estimated that as many as half of attempts to establish PES schemes fail, and this has been attributed in part to the absence of a legal and institutional framework and clear policy objectives to guide PES.²⁵⁹ A survey of PES participants has indicated that the lack of supportive legal and policy frameworks in many countries is a major barrier to establishing PES.²⁶⁰ A broad review of PES schemes worldwide found that many countries lacked the necessary laws and institutions to provide the governance capacity needed to support PES.²⁶¹ Commentary on legal frameworks for PES has pointed to the possible advantages of laws to specifically address PES and has suggested that scaling-up the positive results of existing PES schemes may require a specific policy and legal framework.²⁶² Some argue that in the absence of appropriate legal and institutional frameworks, PES may amplify environmental pressures.²⁶³

Research on legal frameworks for PES suggests that PES-specific legislation can designate roles and responsibilities and streamline PES implementation, reducing transaction costs.²⁶⁴ As discussed above, ES users and providers are unlikely to self-organise. Even when private ES users are willing to fund PES, the involvement of government or another intermediary is almost always needed to organize and facilitate relationships. A legal framework can establish processes and

²⁵⁸ Forest Trends and UNEP *supra* (n 41); Hawkins *supra* (n 238).

²⁵⁹ Bond and Mayers *supra* (n 9).

²⁶⁰ Bennett and Ruef *supra* (n 10).

²⁶¹ Salzman *supra* (n 1).

²⁶² Willaarts et al. *supra* (n 23); Greiber *supra* (n 5); Hawkins *supra* (n 238).

²⁶³ Solazzo Jones and Cooper *supra* (n 190); Van Hecken and Bastiaensen *supra* (n 46).

²⁶⁴ Willaarts et al. *supra* (n 23); Greiber *supra* (n 5); Hawkins *supra* (n 238).

institutions to link parties, including bringing together public and private actors.²⁶⁵ Where public entities fund PES schemes, rules respecting how public funds are applied can promote fairness and accountability. An appropriate legal framework can also encourage participation by providing certainty and clarity. Legislation can be used to create or enable a specific entity to lead or participate in PES.²⁶⁶ For example, where there is uncertainty about whether PES is within the scope of the mandate and spending rules for government agencies or regulated entities such as water utilities.²⁶⁷ Conversely, depending on its design, it is possible that overregulating PES can create unnecessary bureaucracy and increase transaction costs.²⁶⁸

Legislation has been the most effective mechanism for long-term, guaranteed funding for PES.²⁶⁹ Legislation can effectively create a regulated market for PES, for example by establishing trading and offset compliance markets. Laws can also establish user fees, charges or taxes on ES users or activities that have a role in degrading ecosystems, and direct these as dedicated funding sources for PES. In this way, instruments designed on the basis of the polluter pays principle may be implemented in tandem with PES to reward stewardship. Laws may also establish the role of government agencies to fund PES on behalf of the public.²⁷⁰

Laws can also establish the more indirect role of governments to facilitate and encourage private sector involvement in PES. For example, laws can mandate the maintenance of national inventories of natural capital and ecosystem services, to ensure continuity in the information used to support PES over the long term. Public registries for PES agreements are another emerging mechanism to provide institutional support to scale up PES: registries provide an electronic database containing information on projects and transactions, which can support transparency and accountability, and track information that can be used for planning and coordination purposes. The responsibility of government to manage such registries can also be mandated in legislation.²⁷¹ In particular, compared to a regulatory regime, PES opens up participation in conservation measures to a wide range of actors, whereas transparency and accountability can be reduced where the

²⁶⁵ Salzman and Ruhl *supra* (n 144); Willaarts et al. *supra* (n 23); Bond and Mayers *supra* (n 9).

²⁶⁶ Willaarts et al. *supra* (n 23); Greiber *supra* (n 5).

²⁶⁷ Bennett and Ruef *supra* (n 10).

²⁶⁸ Greiber *supra* (n 5).

²⁶⁹ L Bremer 'One size does not fit all: Natural infrastructure investments within the Latin American Water Funds Partnership' (2016) 17 *Ecosystem Services* 217.

²⁷⁰ Greiber *supra* (n 5); Bond and Mayers *supra* (n 9).

²⁷¹ Hawkins *supra* (n 238).

details of these measures are the subject of private agreements.²⁷² Registries can support transparency, access to information, and accountability to the public, which helps to build trust and acceptance of PES as a legitimate policy tool.²⁷³

In the context of implementing the UN REDD+ programme, developing countries must demonstrate that adequate legal and institutional frameworks are in place in order to receive programme funds. This aims to ensure accountability in how funds are directed to forest carbon projects and to ensure that strict criteria are met to demonstrate the ‘additionality’ of projects in providing carbon sequestration or avoided emissions. Research on legal issues related to REDD+ has recommended a nested approach, where communities and local and regional governments are engaged in project design and implementation, within a national framework that determines where funds are allocated and provides guidance for implementation and consistent reporting, in compliance with the UN programme requirements.²⁷⁴ Along these lines, the UN REDD+ Programme has developed the “Jurisdictional and Nested REDD+ framework”, which guides countries in developing governance structures.²⁷⁵

Similarly, researchers have suggested that PES in general should be managed through a nested, multi layered governance structure that engages multiple actors but provides guidance from central governments.²⁷⁶ It has been suggested that a nested approach could scale up watershed-level PES schemes; for example, a national framework could coordinate schemes to achieve improvements to water resources at a larger scale, and could combine local investments with other sources of funding.²⁷⁷ Such nested frameworks can also integrate PES with land use planning from a landscape perspective, taking into account broader considerations and goals.²⁷⁸ It has also been suggested that a nested governance structure could enable place-based PES schemes that bundle multiple ES of local value to be scaled up and effectively support bundles of ES at regional and national levels.²⁷⁹ Laws for PES can set criteria for prioritizing areas to target for

²⁷² Reid supra (n 117).

²⁷³ Willaarts et al. supra (n 23).

²⁷⁴ Denier et al. supra (n 124); F Robles, *Legal analysis of cross-cutting issues for REDD+ implementation* (UN-REDD Programme 2013).

²⁷⁵ Denier et al. supra (n 124).

²⁷⁶ Muradian and Rival supra (n 146).

²⁷⁷ Greiber supra (n 5).

²⁷⁸ Denier et al. supra (n 124).

²⁷⁹ Reed, MS et al. ‘A place-based approach to payments for ecosystem services’ (2017) 43 *Global Environmental Change* 92.

payments based on ES provision, identify the stakeholders that benefit from ES provision, and make links to broader regimes for environmental protection, natural resource management and conservation.²⁸⁰ Conversely, PES-specific laws can risk further fragmenting environmental legislation and creating conflict and uncertainty with existing regimes, if PES is not well integrated into already established frameworks.²⁸¹

3.5.3 Comparative Perspective on Legal Frameworks for Payments for Ecosystem Services

Legal frameworks that apply directly to PES can be categorized roughly into three types: legal frameworks that establish state-run PES; legal frameworks that regulate decentralised PES; and, legal frameworks that enable PES. These different approaches to addressing PES can be distinguished based on how the law relates to the administration and design of PES, and the level of legal intervention by government in PES. The discussion below provides an overview of each category, which will provide the basis for the case studies in the chapters that follow.

Legal Frameworks establishing state-run payments for ecosystem services. As discussed above, state-run PES is often described as ‘public’ or ‘Pigouvian’ PES, as distinguished from the theory of ‘Coasean’ PES where beneficiaries of ecosystem services and providers negotiate directly.²⁸² This type of government payment scheme is the dominant type of PES scheme being applied across both developed and developing countries.²⁸³ The legal basis for Costa Rica’s national Payment for Environmental Services Program (*Programa de Pago de Servicios Ambientales*, ‘PPSA’) and Ecuador’s *Proyecto Socio Bosque*, will be discussed in Chapter 4. The legal frameworks developed around many of these national programmes provide the basis for channelling international REDD+ payments.²⁸⁴

Legal frameworks establishing state-run PES represent the highest degree of intervention by government, given that the government creates and operates the scheme itself. State-run schemes are generally established in law (although they may operate under government policy without a specific legal basis). The legal framework also generally determines the ecosystem services targeted and who is eligible to participate. Generally, a centralized fund is established and a

²⁸⁰ G Alarcon et al. ‘The Challenges of Implementing a Legal Framework for Payment for Ecosystem Services in Catarina, Brazil’ (2016) 14(2) *Natureza & Conservação Brazilian Journal of Nature Conservation* 35.

²⁸¹ Greiber supra (n 5).

²⁸² Vatn, supra (n 45); Greiber supra (n 5); Engel, Pagiola and Wunder supra (n 2).

²⁸³ Schomers and Matzdorf supra (n 4).

²⁸⁴ Denier et al. supra (n 124).

designated government agency is mandated to allocate payments according to prescribed criteria. Payments are typically conditional on land management activities such as retention of natural forests, ecosystem restoration, or sustainable agricultural practices.²⁸⁵

Legal Frameworks regulating decentralised payments for ecosystem services. The introduction of specific laws to regulate PES is a recent and novel development. This type of legal framework does not establish a PES scheme itself, but rather creates a regulatory framework for PES, authorizing and promoting voluntary, decentralized development of PES within regulatory limits. The law establishes central government oversight over PES schemes, which may be operated and funded by local or regional governments or by private parties. It sets out the responsibilities of designated agencies with respect to PES, and may also require the maintenance of a central public registry of PES agreements. It also typically provides enabling authorities to authorize public entities to enter into PES agreements and to permit the use of public funds towards PES. The legislation may elaborate rules on PES participants, PES design and terms of payment, or provide regulatory authorities for the development of such rules.

Peru and Colombia have become leading jurisdictions in establishing this type of legal framework,²⁸⁶ considered “groundbreaking” in further developing PES as a tool for ecosystem conservation.²⁸⁷ The Peruvian law has the broadest application, establishing national jurisdiction to regulate all PES in the country, whether publically or privately funded and operated. The Colombian law provides national regulatory oversight over municipal and regional governments that develop PES schemes with private landowners for source water protection. Two other examples of laws that regulate decentralized PES, worth mentioning briefly here, are provided by Vietnam and the U.S. State of Florida.

Vietnam has a comprehensive national regulatory framework establishing institutional arrangements for PES operated mainly by provincial governments, and funded through user fees on specific sectors that benefit from ES (such as hydroelectricity, tourism, forestry and aquaculture). It defines four types of ecosystem services that may be the subject of PES agreements: watershed protection; landscape beauty; forest carbon sequestration and retention; and provision of habitat for fish and shellfish. A combination of legal and policy instruments sets out detailed rules and

²⁸⁵ Bennett and Ruef supra (n 10); Willaarts et al. supra (n 23).

²⁸⁶ Willaarts et al. supra (n 23).

²⁸⁷ G Bennett and N Carroll (eds), *Gaining Depth: State of Watershed Investment 2014* (Forest Trends 2014), ix.

guidance for provincial governments to enter into PES contracts, determine the eligibility of payment recipients and collect funds to direct towards PES. In the case of watershed protection, water service providers and hydroelectric companies are required to pay a fixed amount based on the volume of water used or kilowatt-hours produced, respectively, which is directed to upstream forest conservation.²⁸⁸

In Florida, the state legislature passed statutory amendments to its water resources law in 2016, introducing provisions to regulate payments for hydrological services on private land. In 2011, the Department of Environmental Protection together with the South Florida Water Management District initiated a series of ‘water farming’ pilot projects aimed at restoring water flows to the northern everglades. Private landowners were contracted to retain water on their properties through interventions to construct or restore wetlands, allowing the flooding of parts of their property. The project was successful in achieving measurable results in terms of water recharge and restoring hydrological ES.²⁸⁹ However, scrutiny of the programme revealed that politicians received ‘kickbacks’ from a large agricultural corporation that, as an owner of large areas of land in the watershed, would benefit from continuation of the scheme.²⁹⁰ This raised questions about the ecological basis for selecting properties for millions of dollars in PES expenditures, and undermined public support for the concept of PES.²⁹¹ In response, the 2016 amendments were introduced to improve accountability in public funding for PES. The law sets out the purpose of public spending for improvements on private land: to accomplish water storage, groundwater recharge and/or water quality protection. It requires that payment terms be set out in writing, and that baseline ecological conditions on the property be ascertained and documented in the agreement before any improvements are made.²⁹² These requirements provide an example of a lighter regulatory touch to guide PES.

²⁸⁸ TT Pham et al., *Payments for forest environmental services in Vietnam: From policy to practice* (Occasional Paper 93, CIFOR 2013)

²⁸⁹ ‘Water Storage Strategies’ (South Florida Water Management District) <<https://www.sfwmd.gov/our-work/water-storage-strategies>> accessed 2 May 2018.

²⁹⁰ In the form of cash and helicopter rides, as reported in: C Pittman and M Van Sickler ‘Copter rides and cash persuaded Florida lawmakers to spend tax money on water-farming’ (Miami Herald, 10 May 2015) <<http://www.miamiherald.com/news/local/in-depth/article20626539.html>> accessed 2 May 2018.

²⁹¹ K Rizzardi ‘Overpayment for Ecosystem Services: A Cautionary Tale from the Northern Everglades’ (Presentation at Legal Adjudication and Ecosystem Services, CECHR Workshop, University of Dundee, UK, 12 April 2016).

²⁹² Fla. Stat. (2016), Sec. 373.4591.

Legal Frameworks enabling payments for ecosystem services. Legal frameworks can influence the development of PES in important ways without stand-alone laws that establish or regulate PES. Enabling laws can provide clarity that PES is permissible in certain contexts, which may be necessary where participants are government agencies or entities, the spending or activities of which are otherwise regulated. Legal reform may also address any specific barriers that might prevent PES. For example, the case studies in chapter 6 will examine how PES is implicitly or explicitly enabled within the context of regulatory regimes for drinking water protection and water service provision. As noted above, water utilities have generally not been active participants in water funds, despite the prominence of this type of PES, led mostly by NGOs. This may be due to regulatory frameworks that do not allow utilities to contribute to pooled funds. Furthermore, expenditures related to the protection or restoration of ecosystems in upstream watersheds may not be in the scope of spending allowed under water utilities regulations.

New York City operates one of the most well-established and most cited examples of PES globally, to protect drinking water sources in the Catskills watershed. Features of federal U.S. law enable this scheme, within the context of compliance with regulatory requirements for protecting drinking water sources. England has some emerging examples of PES led by water service providers, with an enabling legal and policy context and specific regulatory reforms to encourage uptake of PES. Ontario is notable for its comprehensive legal framework addressing the protection of drinking water sources, which specifically enables PES at the local level, while such schemes have been slow to develop in practice. Legal reforms in California also represent a progressive and innovative approach to enabling PES in the context of water service provision, but were made too recently to be considered in detail in this thesis. These changes explicitly recognize that natural spaces such as forests and meadows can qualify as water ‘infrastructure’ under state law, opening the door to financing tools for ecosystem restoration and conservation, which were previously only available for built infrastructure.²⁹³

3.6 Conclusions

Payments for ecosystem services schemes are gaining traction globally and are expected to increasingly complement command-and-control measures for environmental protection and conservation. The use of positive economic incentives can be effective and more efficient than

²⁹³ Bennett and Ruef supra (n 10).

other interventions, especially to support ecosystem protection and restoration on private land.²⁹⁴ However, it is important to acknowledge that many factors beyond economic motivations influence decisions about ecosystem use. PES is one policy tool among others within a broader policy and legal framework, and theorized economic models of PES are largely disconnected from implementation of PES in practice. Careful consideration is needed as to whether PES is an appropriate approach in a given context, and research points to the need to establish broader institutional and governance structures to guide PES.²⁹⁵

This thesis considers PES from the perspective of designing legal frameworks for PES, and takes a normative perspective that legal frameworks are designed based on policy objectives. The case studies in the following Chapters 4, 5 and 6 will explore how legal frameworks can contribute to the governance of PES and shape its design and implementation. Whether or not PES is an effective and appropriate tool in a given scenario depends on many factors and will vary depending on the context of a given jurisdiction, community and environment. This thesis does not attempt to define parameters for a successful PES scheme. Rather, it analyses the role of legal frameworks in establishing parameters for PES. Informed by the review of PES in this chapter, the case studies are structured to consider:

- i) An overview of the context and legal framework for PES (including: the environmental and economic development context; the legal and institutional context; and an overview of the legal and policy framework specific to PES);
- ii) How the law addresses key elements of PES administration (including: providing oversight of PES; identifying ES users and securing funding for PES; and determining the eligibility of ES providers to receive payments); and,
- iii) How the law addresses key elements of PES design (including: the targeting of ecosystem services; the structure of incentives and payment terms and conditions; and monitoring and enforcement of PES agreements).

Some key themes can also be drawn out of the broader discourse around PES that will be discussed in the case studies. This includes consideration of the role of government and institutions for PES, and issues of accountability and transparency. The case studies will also explore how the

²⁹⁴ Salzman et al. supra (n 1); Greiber supra (n 5); Bond and Mayers supra (n 9); Bennett and Ruef supra (n 10); Willaarts et al. supra (n 23); TEEB supra (n 136).

²⁹⁵ Engel supra (n 36).

legal framework reflects a particular policy rationale or theory underlying PES and any tensions or synergies between the polluter pays principle and rewarding stewardship. The case studies will consider whether the law addresses property rights in ES, and the extent to which the legal frameworks for PES supports commoditization and exchange of ES. Finally, the case studies will consider the extent to which PES, and in particular PES for the protection of drinking water, is integrated within broader legal and policy frameworks for the management of ecosystems.

CHAPTER 4
LAWS ESTABLISHING STATE-RUN PAYMENTS FOR ECOSYSTEM SERVICES:
CASE STUDIES FROM COSTA RICA AND ECUADOR

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4.1 Introduction

This chapter considers two case studies of legal frameworks that establish a PES scheme carried out by the state. Section 4.2 examines the legal framework establishing Costa Rica’s national PES programme, which is one of the best-known models of government-financed PES.¹ Section 4.3 examines the legal framework establishing Ecuador’s national PES programme, which is less well known, but particularly interesting, as it is set in a context where ES and PES are specifically contemplated in the country’s constitution. In both examples, the laws establish a national PES scheme that applies uniformly within the country jurisdictions. The case studies do not include a consideration of any specific PES agreements that are being implemented under the schemes. The chapter will conclude with an analysis in section 4.4 of the role of legal frameworks in shaping PES in these two examples, and how this relates to the broader issues surrounding ecosystem services and PES identified in Chapters 2 and 3.

4.2 Costa Rica’s Payments for Environmental Services Programme

4.2.1 Context and Overview of Legal Framework for PES

Environmental and economic development context. Costa Rica is the third-smallest country in Central America, with an area of about 51,000 square kilometres.² It had a population of

¹ | Porras et al., *Learning from 20 Years of Payments for Ecosystem Services in Costa Rica* (International Institute for Environment and Development 2013).

² ‘Surface Area (sq. km)’ (The World Bank: Data)

<https://data.worldbank.org/indicator/AG.SRF.TOTL.K2?year_high_desc=true> accessed 6 May 2018.

about 4.8 million in 2016,³ with 22 percent residing in rural areas in 2016, compared to 66 percent in 1960, though the trend towards urbanization has slowed in recent years.⁴ It is one of the most politically and economically stable democracies in Latin America, with successive peaceful democratic elections since 1948.⁵ It has a High Human Development Index (ranked 66th in the world in 2015, according to the United Nations Development Programme),⁶ with a GDP per capita of US \$11,824 in 2016, significantly below the OECD average of US \$36,881.⁷ While there are very low levels of extreme poverty,⁸ about 28 percent of the rural population lives below national poverty lines.⁹ Costa Rica is a world leader in ecotourism, and tourism is a top contributor to the economy, along with the information and technology sector.¹⁰

Economic development policies strongly support nature conservation, a shift that began in the 1990s, and there has been steady economic expansion over the past 25 years.¹¹ In 2007 Costa Rica set a goal of becoming carbon neutral by 2021; it has achieved 98 percent renewable energy and is working towards offsetting other emissions.¹² Costa Rica's ecosystems are of global importance: with just 0.03 percent of the world's landmass, it holds 4.8 percent of all known species on earth, making it one of the top 20 most biodiverse countries in the world.¹³ Natural ecosystems, including dry forests, cloud forests, rainforests, wetlands and mangroves, cover about 55 percent of the country, although landscapes are fragmented and few tracts of high ecological integrity remain.

³ 'Population, total' (The World Bank: Data)

<https://data.worldbank.org/indicator/SP.POP.TOTL?year_high_desc=false> accessed 6 May 2018.

⁴ 'Rural population (% of total population)' <<https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?view=chart>> accessed 6 May 2018.

⁵ T Garvin et al. "Growing together": transnational policy networks and environmental policy change in Costa Rica" (2015) 7(1) *Int. J. Society Systems Science* 1.

⁶ 'Human Development Data (1990-2015)' (United Nations Development Programme, Human Development Reports) <<http://hdr.undp.org/en/data>> accessed 6 May 2018.

⁷ 'GDP per capita (current US\$)' (the World Bank: Data) <<http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>> accessed 6 May 2018.

⁸ 'MDG Country Progress Snapshot: Costa Rica' (United Nations Statistics Division)

<<http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2015/Snapshots/CRI.pdf>> accessed 8 January 2018.

⁹ 'Rural poverty headcount ratio at national poverty lines (% of rural population)' (the World Bank: Data)

<<http://data.worldbank.org/indicator/SI.POV.RUHC?display=default>> accessed 6 May 2018.

¹⁰ *Costa Rica: Objetivos de Desarrollo del Milenio, II Informe País 2010 [MDGs, Country Report II]* (Costa Rica, Ministerio de Planificación Nacional y Política Económica [Ministry of National Planning and Economic Policy] 2010); Garvin et al. supra (n 5).

¹¹ *ibid.*

¹² This goal was reiterated in: *Costa Rica's Intended Nationally Determined Contribution* (Government of Costa Rica, Ministry of Environment and Energy, 2015) <<http://www4.unfccc.int/ndcregistry/Pages/Party.aspx?party=CRI>>, accessed 8 January 2018.

¹³ Costa Rica[...] MDGs Country Report II supra (n 10).

The main direct pressures on biodiversity in Costa Rica include habitat loss due to land use changes (mainly for agriculture and ranching) and climate change.¹⁴

Forest management has undergone major changes in Costa Rica over the past 75 years, a legacy which directly influenced the development of the national Payment for Ecosystems Services Programme [*Programa de Pagos por Servicios Ambientales*, PPSA]. The country's total forest cover dropped from 70 percent in 1950 to a low of just 20 percent in the 1980s.¹⁵ High rates of deforestation in that period were driven by policies such as low-cost credit for livestock, land-titling laws rewarding the cutting of forests, and taxes on 'unproductive' lands.¹⁶ This was exacerbated by high international prices for beef and crops such as coffee and bananas, and when the global market for these goods collapsed in the 1980s, a significant portion of agricultural land was abandoned.¹⁷ A series of policies between the 1970s and mid 1990s granted tax exemptions and subsidies to reforestation projects, but sometimes had the perverse effect of forested land being clear-cut and then reforested.¹⁸

Policy changes at the World Bank in the mid-1990s forced Costa Rica to terminate the reforestation subsidies, which were replaced with the PPSA, seen as a creative solution, supported by the forestry lobby, the environmental movement, and leading politicians.¹⁹ The PPSA combined with the National System of Conservation Areas has been instrumental in restoring forest cover.²⁰ In 2014, about 54 percent of land was forested and 35 percent was agricultural land.²¹ By 2010, Costa Rica was the only country in Latin America where forest cover was not decreasing.²² Together, protected areas and the PPSA protect 35 percent of the country and 70 percent of its forests, with

¹⁴ 'Costa Rica – Country Profile' (Convention on Biological Diversity Country Profiles)

<<https://www.cbd.int/countries/profile/default.shtml?country=cr>> accessed 15 January 2018.

¹⁵ Porras et al. supra (n 1).

¹⁶ K Karousakis, *Incentives to Reduce GHG Emissions from Deforestation: Lessons learned from Costa Rica and Mexico* (OECD 2007).

¹⁷ Porras et al. supra (n 1).

¹⁸ K Bennett and N Henninger, *Payments for Ecosystem Services in Costa Rica and Forestry law No. 7575: Key Lessons for Legislators* (World Resources Institute 2009).

¹⁹ *ibid.*

²⁰ Porras et al. (n 1); GK Rosendal and PJ Schei 'How may REDD+ Affect the Practical, Legal and Institutional Framework for 'Payment for Ecosystem Services' in Costa Rica?' (2014) 9 *Ecosystem Services* 75.

²¹ 'Costa Rica' (Food and Agriculture Organisation of the United Nations)

<<http://www.fao.org/countryprofiles/index/en/?iso3=CRI>> accessed 8 January 2018.

²² 'Global Forest Resources Assessment 2010' (Food and Agriculture Organization 2010)
<www.fao.org/docrep/013/i1757e/i1757e.pdf> accessed 18 January 2018.

the remaining forests under control of private owners or Indigenous associations.²³ Between 1997 and 2017, a total of 16,498 contracts were financed under the PPSA, covering a total of over 1 million hectares (about 20 percent of Costa Rica's total land area),²⁴ representing an investment of about US \$360 million. Costa Rica is a UN REDD+ Project Partner, and is also implementing REDD+ via the PPSA.²⁵

Land tenure in Costa Rica is stable relative to other Latin American countries, but rural land ownership remains concentrated as a result of its colonial history. Rural properties are characterised by about 60 percent smallholdings (under 10 hectares) that occupy about 5 percent of total farm area, and about 3 percent large properties (over 200 hectares) that occupy almost half of total area.²⁶ Indigenous peoples make up about 1.68 percent of the population, with 24 indigenous territories representing about 6.5 of the country's land area.²⁷

Water management lags behind Costa Rica's environmental record in other areas. Water supply is abundant overall, however, there is significant seasonal variability in rainfall, and regional variability ranging from humid to semi-arid zones. Water pollution remains one of the most significant environmental challenges in Costa Rica. Streams are largely too polluted to be used for drinking water, with contamination from untreated sewage, sediment and agricultural chemicals. Almost all drinking water is sourced from groundwater aquifers, which are composed of porous volcanic rock, which is also vulnerable to pollution.²⁸ Nevertheless, Costa Rica is ahead of other countries in the region in the provision of safe drinking water, with 99.75 percent of the population having access to basic and safely managed drinking water services in 2015, including 99.5 percent in rural areas.²⁹

Legal and institutional context. Costa Rica has a civil law legal system. The country's current constitution was adopted in 1949, establishing it as a democratic republic³⁰, and a unitary

²³ *Plan de Implementación de la Estrategia Nacional de Redd+ [National REDD+ Strategy Implementation Plan] Costa Rica* (Secretaría REDD+ [REDD+ Secretariat] Costa Rica 2017).

²⁴ 'Distribución de las hectáreas contratadas en el Programa de Pago por Servicios Ambientales, por año y por modalidad [Distribution of hectares contracted in the PPSA, per year, per modality]' (FONAFIFO 23 May 2017).

²⁵ National REDD+ Strategy Implementation Plan supra (n 23).

²⁶ 'REDD in Costa Rica' (the REDD desk) <<https://theredddesk.org/countries/costa-rica>> accessed 8 January 2018.

²⁷ *ibid.*

²⁸ KM Bower 'Water supply and sanitation of Costa Rica' (2014) 71(1) *Environmental Earth Sciences* 107.

²⁹ 'Costa Rica' (JMP WASH Data) <<https://washdata.org/data#!/cri>> accessed 14 April 2018.

³⁰ Costa Rica's Constitution of 1949 with Amendments through 2011 (Constitute Project, English translation by William S. Hein & Co. 2012), Art. 1.

state.³¹ There is separation of legislative, executive and judicial powers³², with law-making powers vested in the Legislative Assembly.³³ The constitution provides the executive branch, including the President and Ministers, broad powers to make law by executive decree. Ministers may also be authorized to issue regulations or resolutions pursuant to a specific laws.³⁴ The constitution recognizes provinces, cantons (municipalities) and districts as subsidiary levels of government.³⁵ Costa Rica amended its Constitution in 1994 to establish the right of all persons to a healthy and ecologically balanced environment, including it among a number of 'social rights', rather than recognising it as an individual right; there is a corresponding duty on the state to guarantee, defend and preserve the right, by the means provided for in the law.³⁶ Costa Rica was one of the first countries in the world to recognize such a right.³⁷

The *General Environmental Law [Ley General del Ambiente]*,³⁸ introduced in 1995, established the Ministry of Environment and Energy (*Ministerio Nacional de Ambiente y Energia*, MINAE), and provides the overarching framework for environmental protection and natural resource management. The 1998 *Biodiversity Law [Ley de Biodiversidad]*³⁹ created the National System of Conservation Areas (SINAC) as an agency under MINAE, responsible for administering biodiversity protection and protected areas. The law merged the former National Park Service, Forestry Department and the Wildlife Service to encourage an integrated approach to nature conservation.⁴⁰

The 1996 *Forestry Law [Ley Forestal]*,⁴¹ also under MINAE's portfolio, provides the legal framework for forest management and includes strong prohibitions in addition to the positive incentives created under the PPSA. The conversion of existing forests on private land is prohibited (with certain exceptions requiring a permit), and punishable by prison sentences rather than fines.⁴² Harvesting forest resources on state property is also prohibited, and the law declares that all forests

³¹ Constitution supra (n 30), Art. 2.

³² Constitution supra (n 30), Art. 9.

³³ Constitution supra (n 30), Arts. 123-129.

³⁴ Constitution supra (n 30) Art. 140.

³⁵ Constitution supra (n 30) Art. 168-169.

³⁶ Constitution of the Republic of Costa Rica, Art. 50.

³⁷ D Boyd, *The Environmental Rights Revolution* (UBC Press 2012).

³⁸ Law 7554 of 1995.

³⁹ Law 7788 of 1998.

⁴⁰ REDD in Costa Rica supra (n 26).

⁴¹ *Ley Forestal* [Forestry Law], N° 7575 de 1996.

⁴² *ibid*, Art. 19.

on state property and in protected reserves are patrimony of the State.⁴³ The *Forestry Law* establishes the National Forest Finance Fund (*Fondo Nacional de Financiamiento Forestal*, FONAFIFO), as an agency under MINAE responsible for managing and supporting development of the forest sector,⁴⁴ and the National Forestry Office (*Oficina Nacional Forestal*, ONF), as a non-state public entity, with the purpose to promote and coordinate private forestry sector organizations.⁴⁵ The ONF has a membership of 40 accredited organizations representing forestry and agro-forestry producers, timber merchants, artisan organizations and furniture producers and environmental groups.⁴⁶

Costa Rica's *Water Law* [*Ley de Aguas*] dates back to 1945.⁴⁷ It declares that all surface and ground waters are public goods and national property,⁴⁸ and gives MINAE primary responsibility for water management,⁴⁹ which is administered by the national water authority established under MINEA.⁵⁰ Responsibility for water supply and sanitation is shared by MINAE and the Ministry of Health under the *Potable Water General Law* [*Ley General de Agua Potable*].⁵¹ Water and sanitation services are provided either by municipalities or private companies in urban areas, with regulatory oversight from an autonomous state agency, the Costa Rican Institute of Aqueducts and Sewers (Instituto Costarricense de Acueductos y Alcantarillados, AyA). In addition to its regulatory role, AyA is also responsible for operation of water and sewer services in rural areas throughout the country.⁵² A bill proposing a new Law for the Integrated Management of Water Resources,⁵³ to replace the Water Law, is being debated in the Legislative Assembly. MINEA also issued a National Water Policy in 2009, setting out principles and priorities based on IWRM.⁵⁴ Among its key principles are: recognition of the human right to access to potable water and basic sanitation; an ecosystem focus for water resources management; harmonization of land use planning and water

⁴³ *ibid*, Arts. 1 and 13.

⁴⁴ *ibid*, Art. 46.

⁴⁵ *ibid*, Art. 7.

⁴⁶ 'Oficina Nacional Forestal' [National Forestry Office] <<https://www.onfcr.org>> accessed 5 December 2017.

⁴⁷ Law No. 276.

⁴⁸ *ibid*, Art. 1 - 2.

⁴⁹ *ibid*, Arts. 18-29

⁵⁰ 'Dirección de Agua [Water Directorate]' <<http://www.da.go.cr>> accessed 5 December 2017.

⁵¹ Law 1634 of 1953.

⁵² 'Aya' <<http://www.da.go.cr/aya/>>; Law 2726 of 1961.

⁵³ Proyecto de Ley No. 17.742: Gestión Integrada del Recurso Hídrico [Bill No. 17.742: Integrated Water Resource Management Law].

⁵⁴ *Política Hídrica Nacional* [National Water Policy] (MINEA, Costa Rica 2009).

resources development; and the polluter pays principle, with internalization of environmental and social costs for water contamination.⁵⁵ The policy outlines eight strategic priorities for action, with several focused on improved governance. The umbrella priority ‘water resource sustainability’ contains measures for the conservation and protection of watersheds, including promotion of payments for ecosystem services on lands representing priority aquifer recharge and discharge areas.⁵⁶

Overview of the legal and policy framework for payments for ecosystem services. The PPSA was introduced in 1997 with the objective of restoring forest cover and reducing deforestation. It specifically aims to protect the ecosystem services provided by forests, and provides financial incentives to private landowners for a range of different possible activities on their land (grouped as ES ‘modalities’), including forest protection, sustainable forest management reforestation and agroforestry. In applying an ecosystem services approach, the stated intention of the programme is to replace the traditional concept of subsidies in the forest sector with economic recognition for the provision of ecosystem services.⁵⁷ The conservation incentives created by the PPSA were included as part of the broader suite of reforms enacted under the *Forestry Law*.⁵⁸

The PPSA is legally established through provisions in the national *Forestry Law*, which create authorities for its administration, and set out four categories of eligible ecosystem services, relating to: carbon storage, water, biodiversity and scenic natural beauty.⁵⁹ While the statutory basis for the PPSA has remained the same since 1997, implementation of the programme has undergone several changes over time. The *Forestry Law* is complemented by a number of subordinate, more flexible, legal tools that have allowed for adaptation of the programme. Detailed rules respecting the implementation of the PPSA are set out in a regulation under the *Forestry Law* (the ‘Forestry Regulation’), which was established in 1997, and amended substantially in 2017.⁶⁰ An operations manual, which was issued by executive decree in 2009, sets out further rules and templates relating

⁵⁵ *ibid*, part 5.1.

⁵⁶ *ibid*, part 5.5.

⁵⁷ ‘Pago de Servicios Ambientales [Payments for Ecosystem Services]’ (FONAFIFO) <www.fonafifo.go.cr/psa/> accessed October 25 2015.

⁵⁸ Porras *supra et al.* (n 1).

⁵⁹ *Forestry Law supra* (n 41).

⁶⁰ *Reglamento a la Ley Forestal* [Regulation of the Forestry Law], Decreto Ejecutivo N° 25721-MINAE, 23-01-1997, as amended by Decreto Ejecutivo 39871-MINAE, Alcance 181A, Gaceta 176, 20-09-2016.

to PPSA agreements.⁶¹ Annual budget allocations are prescribed by resolution of the Minister of Environment and Energy.⁶²

The PPSA operates in coordination with other national laws and policies. For example, tax laws are used to dedicate funding sources to the PPSA.⁶³ The prioritization strategy for the PPSA also takes into account priorities set by national biodiversity policies and priority areas for watershed protection identified in accordance with the national Water Policy. The PPSA is not a monopoly on all PES in the country and various other local PES schemes have developed independently, mainly led by non-governmental organizations.⁶⁴ The *Forestry Law* and other rules respecting the PPSA do not apply to activities outside the PPSA or PES generally.

4.2.2 PES Actors, Administration and Oversight

Administration and oversight. The *Forestry Law* declares that conservation of forest resources in the public interest is an essential function of the state.⁶⁵ The duty of the state to fulfill the constitutional right to a healthy and ecologically balanced environment is also explicitly cited in executive decrees relating to the PPSA, providing underlying authority and justification for the programme.⁶⁶ The *Forestry Law* establishes FONAFIFO as a semi-autonomous agency charged, among other things, with the implementation of the PPSA, with oversight from MINAE.⁶⁷ The composition of FONAFIFO's governing board is set out in the *Forestry Law*, which requires one representative from each of MINAE, the Ministry of Agriculture, and the National Banking System, as well as two representatives from the private forestry sector, who are selected by the National Forestry office (note, this list does not include any public-interest NGOs or other members representing the general community or environmental interests).⁶⁸ FONAFIFO directly administers most aspects of the programme, including entering into contracts with participants, pursuant to broad authorities in the *Forestry Law* to enter into agreements related to forest management and

⁶¹ *Manual de procedimientos para el Pago de Servicios Ambientales*, Gaceta N°46, 06-03-09 [Manual of Procedures for the Payment for Ecosystem Services Programme].

⁶² For 2017, see: Resolución R-541-2016-MINAE, Alcance N° 4, Gaceta N° 5, 6-01-2017.

⁶³ Ley de Simplificación y Eficiencia Tributaries [Taxation Simplification and Efficiency Law], Law 8114 of 2001; *Canon por Concepto de Aprovechamiento de Aguas* [Water use tariff] - Decreto Ejecutivo N° 32868-MINAE 30-01-2006, Art. 14.

⁶⁴ 'Payments for Environmental Services in Costa Rica: From Rio to Rio and Beyond' (International Institute for Environment and Development Briefing, May 2012) <<http://pubs.iied.org/17126IIED>> accessed 1 October 2015.

⁶⁵ *Forestry Law* supra (n 41), Art. 1.

⁶⁶ *Manual*, supra (n 61), Art. 1.

⁶⁷ *Forestry Law* supra (n 41), Art 46.

⁶⁸ *Forestry Law* supra (n 41), Art. 48.

conservation.⁶⁹ FONAFIFO prepares the PPSA annual budget, which allocates funds to different types of ES contracts depending on priorities each year. The budget must be approved by the Minister of Finance, prior to being published in a resolution of the Minister of Environment and Energy.⁷⁰ Prior to 2016, this was done by executive decree, but amendments to the Forestry Regulation simplified the decision-making procedure and allowed MINAE greater discretion by enabling ministerial resolutions. FONAFIFO also tracks the scheme's contribution to national environmental objectives and reports this to MINAE.⁷¹

The role of FONAFIFO has also evolved since the outset of the programme. When the PPSA was first introduced, both FONAFIFO and SINAC (the agency in charge of national protected areas), as well as NGOs acting on behalf of the agencies, shared responsibilities for arranging PES contracts. Some experiences indicated that this led to significant variation in the process and reasoning behind selection of PES participants, and added administrative burden and confusion due to overlapping roles.⁷² To support a more consistent and cohesive approach, authority for PES contracting was transferred solely to FONAFIFO in 2003.⁷³ FONAFIFO created eight regional offices,⁷⁴ which improved the efficiency of the contracting process.⁷⁵ Costa Rican NGOs continue to have an important role as intermediaries, promoting the PPSA and providing services to support the application process. Normally, services are provided on the basis of a commission or fee (usually between 12 and 18 per cent of payment).⁷⁶

Beneficiaries, buyers and funding. The *Forestry law* gives FONAFIFO responsibility for managing a fund dedicated to the PPSA, and broad authority to obtain financing via: tax revenues, grants and loans from national and international institutions, debt relief, and agreements with the private sector, as well as market instruments.⁷⁷ An increasingly diverse combination of these sources has contributed to the PPSA since its inception, with trends towards less reliance on international sources. Domestic sources including taxes and general budget allocations accounted

⁶⁹ Forestry Law supra (n 41), Art. 47.

⁷⁰ Regulation of the Forestry Law supra (n 60), Art. 38, as amended by Decreto Ejecutivo N° 25721-MINAE, Art. 2.

⁷¹ FONAFIFO supra (n 57).

⁷² Bennett and Henninger supra (n 18); M Miranda, I Porras, ML Moreno, *The social impacts of payments for environmental services in Costa Rica A quantitative field survey and analysis of the Virilla watershed* (International Institute for Environment and Development 2003).

⁷³ MINAE Executive Decree 30762 of 2002.

⁷⁴ Manual supra (n 61), Art. 7.

⁷⁵ Karousakis supra (n 16).

⁷⁶ Porras et al. supra (n 1).

⁷⁷ Forestry Law supra (n 41), Art 47.

for about 77 percent of the programme's total funding of about US \$360 million between 1995 and 2017, while international loans and grants accounted for 21 percent and private investment about 2 percent. The annual budget has trended steadily upward from about US \$3 million in 1995 to about US \$29 million in 2017.⁷⁸

There are two taxes that provide dedicated funding sources for the PPSA. Amendments to the national tax law in 2001 dedicated 3.5 percent of the national fuel tax to the PPSA, which must be applied specifically to forest carbon storage.⁷⁹ In 2006, MINAE also established a new national tax on large-scale water users,⁸⁰ with 25 percent of revenues dedicated to FONAFIFO to implement PPSA agreements for hydrological services, within the basin where revenues were generated.⁸¹ The stated objective of the tax is to reflect both the use value of water and the value of ecosystem services derived from protecting hydrological resources.⁸² Each of these taxes target those with an impact on ES, which is consistent with the 'polluter pays' principle. Water users both impact the resource and benefit from it, and can also be understood as ES beneficiaries.

The law deals with the prospect of potential markets for ES, and states that FONAFIFO is responsible for any 'commercialization' of ecosystem services generated from the PPSA.⁸³ The standard terms of the PPSA contract stipulate that participants agree to assign to FONAFIFO the rights associated with the ecosystem services that are the subject of the contract, and specifically, any rights associated with the reduction, avoidance or fixing of greenhouse gas emissions.⁸⁴ The Forestry Regulation specifically authorizes FONAFIFO to manage certificates or credits for ES generated by the PPSA, provided that participants have assigned these rights to FONAFIFO under contract.⁸⁵ In this way, the government is positioned as a broker between participants and buyers outside government, in cases where markets for such ES credits exist.

⁷⁸ 'Estadísticas del Pago de Servicios Ambientales [Payment for Ecosystem Services Statistics]

<http://www.fonafifo.go.cr/psa/estadisticas_psa.html> accessed 18 January 2018

⁷⁹ *Ley de Simplificación y Eficiencia Tributaries* [Taxation Simplification and Efficiency Law], Nº 8114 de 2001, Art. 5.

⁸⁰ Decreto Ejecutivo Nº 32868-MINAE 30-01-2006, Art. 14. The categories of water use are: human consumption, industrial use, commercial use, agroindustrial processes, tourism uses (including water used for hotels, recreation, restaurants, bars and swimming pools), irrigation for agriculture, aquaculture, and hydroelectricity.

⁸¹ Decreto Ejecutivo Nº 32868-MINAE 30-01-2006, Art. 14; 25 percent of revenues also finance watershed protection by the National System of Conservation Areas, and the remaining half is applied to water management programmes, including infrastructure development.

⁸² Decreto Ejecutivo Nº 32868-MINAE 30-01-2006, Art. 3.

⁸³ Forestry Law *supra* (n 41), Art. 47 and Regulation of the Forestry Law, Art. 63.

⁸⁴ Manual *supra* (n 61), Annex 11, para 2.

⁸⁵ Regulation of the Forestry Law *supra* (n 60), Art. 55, as amended by Decreto Ejecutivo Nº 25721-MINAE, Art. 7.

To encourage private sector investment, FONAFIFO also created Certificates of Ecosystem Services (Certificado de Servicio Ambiental, CSA), which are issued in exchange for voluntary contributions to the PPSA.⁸⁶ This is implemented as a policy initiative under FONAFIFO's broad powers relating to PPSA financing, without a specific legal basis. Buyers purchase one CSA to fund the conservation of 1 hectare, targeting ES for water, biodiversity, carbon or landscape beauty. Under general tax laws relating to charitable donations, CSAs are tax-deductible. These voluntary instruments are promoted as a corporate environmental and social responsibility investment, with low transaction costs, transparency and convenience compared to individually negotiated PES agreements. FONAFIFO also signed ground-breaking voluntary agreements with three hydroelectric companies and the beverage company Florida Ice & Farm between 1997 and 2004.⁸⁷

The Forestry Regulation also limits spending on administration of the PPSA, providing that FONAFIFO may direct up to 21 percent of the income received from the fuel tax to its own technical and administrative expenses. It also requires FONAFIFO to transfer 1.3 percent of its total budget to SINAC and 0.67 percent of its total budget to the National Forestry Office, to support their participation in the PPSA.⁸⁸

Eligibility for payments. Participants in the PPSA may be individuals or incorporated legal entities such as forest producers, conservation organizations, or Indigenous associations.⁸⁹ Generally, they must be owners, tenants or have rights of use in property that are registered in the National Registry.⁹⁰ Participation is voluntary, and prospective participants must apply in accordance with standardized application process. The operations manual includes a template application form, and requires that applicants provide documents such as proof of identity, land title, and history of tax payments.⁹¹ Applications also must include an assessment of the condition of the land, prepared by a licensed forester in accordance with a template set out in the manual.⁹² Applications are received for a period of 45 business days beginning in February each year,⁹³ and amendments to the Forest Regulation in 2017 established a maximum period of sixty days for

⁸⁶ Porras et al. supra (n 1).

⁸⁷ *ibid.*

⁸⁸ Regulation of the Forestry Law supra (n 60), Art. 64

⁸⁹ Indigenous associations are the legal governance structures for Indigenous peoples in Costa Rica under the Law 6172 of 1977.

⁹⁰ Regulation of the Forestry Law supra (n 60), Art. 8.

⁹¹ Manual supra (n 61), Art. 7 and Annex I.

⁹² Manual supra (n 61), Art. 6, and Annex II.

⁹³ Manual supra (n 61), Art. 7.

FONAFIFO to process applications.⁹⁴ Applications are screened against minimum eligibility criteria, and further prioritized based on factors designed to maximize the policy goals of the programme, as described below.

Additional rules respecting eligibility have been developed over time, in ways that reflect social equity concerns. For example, in the earlier years of the PPSA, some commentary noted that the requirement for registered land rights excluded poorer landholders with unregistered interests in property.⁹⁵ An executive decree issued in 2004 created an exception to allow consideration of those with unregistered possessory rights, pursuant to a number of conditions, including an inspection of the property by FONAFIFO, an affidavit of three witnesses, and a sworn statement before a public notary. This exception is available for forest protection modalities, but not reforestation or agroforestry modalities.⁹⁶ Presumably, this could be because forest protection does not alter the state of the land, which could be problematic in the event of a land title dispute.

Commentators have also observed that a number of other factors favour participation of larger, wealthier landowners. For example, some poorer landowners with smaller properties reported the administrative process and upfront costs of preparing the PPSA application to be technically complicated and prohibitively expensive.⁹⁷ Also, many of the intermediaries that provide support services to participants, including the private professional foresters that are required to complete land assessments, prefer to work with larger landowners to gain a higher profit from their percent commission.⁹⁸ Furthermore, even with PPSA incentives, restricting land uses for conservation purposes may not be economically feasible for some, when extractive land uses can provide greater returns, especially in the short term.⁹⁹ Some studies have indicated a social prestige associated with the PPSA, and factors such as patriotism and a moral commitment to environmentalism disproportionately influencing the participation of wealthier landowners.¹⁰⁰

⁹⁴ Regulation of the Forestry Law *supra* (n 60), Art. 39, as amended by Decreto Ejecutivo N° 25721-MINAE, Art. 3.

⁹⁵ See, for example: H Rosa, et al., *Compensation for Environmental Services and Rural Communities: Lessons from the Americas and Key Issues for Strengthening Community Strategies* (PRISMA 2003); Miranda, Porrás and Moreno *supra* (n 72).

⁹⁶ MINAE Executive Decree 31633 of 2004.

⁹⁷ Miranda, Porrás and Moreno *supra* (n 72).

⁹⁸ Porrás et al. *supra* (n 1); BS Matulis, 'The narrowing gap between vision and execution: Neoliberalization of PES in Costa Rica' 44 (2013) *Geoforum* 253.

⁹⁹ T Cody 'Sliding-scale environmental service payments and non-financial incentives: Results of a survey of landowner interest in Costa Rica' (2016) 130 *Ecological Economics* 252.

¹⁰⁰ *ibid.*

To help address these obstacles, for a time the PPSA allowed small landowners to group together under a collective contract to spread startup costs across the group. In practice, problems emerged in enforcing contracts against individual members,¹⁰¹ leading to a policy change of allowing group applications, but requiring individual contracts.¹⁰² This still provides some administrative cost savings to participants, albeit much smaller, and some have argued it undermines the social benefits and coherence of collective participation.¹⁰³ Despite challenges, other studies have also indicated the PPSA has had important impacts on household budgets for poorer participants,¹⁰⁴ and that overall the programme has strengthened local capabilities for sustainable forest development.¹⁰⁵

Amendments were also made to the Forestry Regulation in 2016 to facilitate participation of small and medium forest producers, and to prevent disproportionate participation of wealthy landowners. General rules stipulate that for forest protection, each participant may enroll a minimum of two hectares, and a maximum of 300 hectares in the forest protection modality.¹⁰⁶ From 2016 onward, a cap was put on the total area that may be enrolled in the PPSA by any immediate family, or any business operated by immediate family: 600 hectares for forest protection and 750 hectares for reforestation modalities. Also, a total of 25 percent of all available hectares each year must be contracted to organizations of small producers accredited under the National Forestry Office.¹⁰⁷ There is also an exception allowing Indigenous associations to enroll up to 1000 hectares.¹⁰⁸

The 2016 amendments to the Forestry Regulation also introduced other rules to support participation of Indigenous associations. For example, Indigenous associations are exempt from the requirement to hire a licensed forester, and land assessments are instead undertaken by FONAFIFO directly.¹⁰⁹ Other new provisions appear to create safeguards to reduce the potential for conflicts

¹⁰¹ Bennett and Henninger supra (n 18).

¹⁰² Porras et al. supra (n 1).

¹⁰³ Matulis supra (n 98).

¹⁰⁴ Miranda, Porras and Moreno supra (n 72).

¹⁰⁵ C Padilla Salas and SA Molina Murillo 'Impacto socioeconómico del Programa Pago por Servicios Ambientales, modalidad reforestación, en el noroeste de Costa Rica [Socioeconomic impacts of the PPSA, reforestation modality, in northeast Costa Rica] (2017) 21(40) *Ambiente y Desarrollo [Environment and Development]* 73.

¹⁰⁶ R-541-2016-MINAE supra (n 62).

¹⁰⁷ Regulation of the Forestry Law supra (n 60), Art. 47, as amended by Decreto Ejecutivo N° 25721-MINAE, Art. 5.

¹⁰⁸ R-541-2016-MINAE supra (n 62).

¹⁰⁹ MINAE Executive Decree 39871 of 2016, Arts. 4 and 5.

within Indigenous communities: applications must not only be signed by the president of the association, but include meeting minutes and a record of decision authorizing the association to enter into the PPSA and also approving a report prepared by the treasurer of the association outlining how the payments will be used within the community.¹¹⁰

4.2.3 PES Design

Targeting ecosystem services. The *Forestry Law* defines ‘ecosystem services’ for the purposes of the PPSA as those provided by forest ecosystems in forests and forest plantations, and resulting directly from the protection or restoration of the natural environment. The law further enumerates four categories of ES: (i) carbon fixation, capture and storage; (ii) protection of water for urban, rural or hydroelectric use; (iii) biodiversity conservation, including for scientific research, genetic and pharmaceutical uses; and (iv) scenic natural beauty, including for tourism uses.¹¹¹ ‘Forest ecosystem’ is defined as a state of equilibrium reached after thousands of years, that if left uninterrupted would continue indefinitely and change very slowly.¹¹² The law uses the term ‘servicio ambiental’ which translates directly as ‘environmental service’. However, policy discourse around the PPSA, including within Costa Rica, has transitioned to the more widely used term ‘ecosystem services’.¹¹³

Specific ecosystem services are targeted via various PPSA project ‘modalities’ (or types). The number of hectares (or number of trees) to be enrolled in the PPSA each year within each type of modality is set out by Ministerial resolution (and prior to 2016, by executive decree).¹¹⁴ The way modalities are categorized has changed over time. For the 2017 funding period, activities were divided into two overarching modalities: (i) restoration of forest cover and (ii) maintenance of forest cover.¹¹⁵ These encompass several categories of activities, with allocations to each divided as illustrated in the table below. The 2017 allocations follow the same general pattern of allocations to different types of activities between 1997 and 2016, with larger areas of land under the PPSA being for conservation of existing forests.¹¹⁶

¹¹⁰ Regulation of the Forestry Law supra (n 60), Art. 39, as amended by Decreto Ejecutivo N° 25721-MINAE Art. 4.

¹¹¹ Forestry Law supra (n 41), Art. 3(k).

¹¹² Forestry Law supra (n 41), 3(c).

¹¹³ Porras et al. supra (n 1).

¹¹⁴ This requirement is set out in the Regulation of the Forestry Law supra (n 60), Art. 38, as amended by Decreto Ejecutivo N° 25721-MINAE, Art. 2.

¹¹⁵ R-541-2016-MINAE supra (n 62).

¹¹⁶ Payment for Ecosystem Services Statistics supra (n 78).

Table 4.2.3.1 - Allocations to PPSA modalities (2017)¹¹⁷

Modality	Activity	Allocation	% of total ha.
Restoration of forest cover	Natural regeneration	3000 ha.	8%
	Reforestation with fast-growing species	2, 875 ha.	7%
	Reforestation with slower growing species	2, 735 ha.	7%
	Reforestation with species at risk ¹¹⁸	600 ha.	1.5%
	Agroforestry	500, 400 trees	n/a
	Agroforestry with native species	50, 000 trees	n/a
Maintenance of forest cover	Forest protection	25, 000 ha.	63%
	Forest protection to safeguard water resources: this means areas of importance to water identified by the Water Directorate, FONAFIFO, or MINAE, with consideration of rural aqueducts.	5000 ha.	13%
	Sustainable forest management	200 ha.	0.5%

As discussed below, the payment levels vary for each modality, with reforestation being more expensive. This means that while forest protection represents a larger area, reforestation represents a larger portion of the budget. Between 2015 and 2019, about 75 percent of funding went to reforestation, with about 35 percent of that going to reforestation with species at risk. Within the same period, about 25 percent of funding went to forest protection overall, with about 25 percent of that to protection of water resources.¹¹⁹ Between 2006 and 2016, a total of 738 contracts were financed under the PPSA for the protection of hydrological services, representing about 40 thousand hectares and about US \$15 million.¹²⁰

From within the annual allocations, and subject to the rules respecting eligibility described above, FONAFIFO regional offices select specific applications based on priorities set by MINAE.¹²¹ The assessment process must also be consistent with National Biodiversity Conservation Policies established by SINAC.¹²² While prioritization was previously based on guidance set out in the operations manual¹²³, amendments to the Forestry Regulation in 2016 set out a more detailed points matrix for assessing applications, illustrated in the table below.

¹¹⁷ R-541-2016-MINAE supra (n 62).

¹¹⁸ Including designated by MINAE as either threatened or at risk of extinction.

¹¹⁹ Payment for Ecosystem Services Statistics supra (n 78).

¹²⁰ *ibid.*

¹²¹ MINAE Decree 39083 of 2015, preamble para. 9.

¹²² MINAE Executive Decree 39871 of 2016.

¹²³ Manual supra (n 61), Part 2.3.

Table 4.2.3.2 - PPSA Application Prioritization Matrix¹²⁴

Primary Criteria	Baseline Points
<ul style="list-style-type: none"> • Forests on private farms that are located within protected areas (established by SINAC) • Forests within the Indigenous Territories of the country 	115 points
<ul style="list-style-type: none"> • Forests on farms located in areas defined as sites of importance for conservation (identified by SINAC) • Forests on farms located within conservation corridors (identified by SINAC) 	110 points
<ul style="list-style-type: none"> • Forests that protect sources of drinking water (based on information provided by the Institute of Aqueducts and Sewers, or by municipal water service providers) 	105 points
<ul style="list-style-type: none"> • Forests outside of the above priorities 	55 points
Secondary Criteria	Points added
<ul style="list-style-type: none"> • Forests that have been previously registered in the PPSA with a good record of compliance • Forests on farms located in districts with Social Development Index less than 43.4% (as identified in national sustainable development planning) • Forest areas between 50 and 100 hectares, that are managed by an organization pursuant to an agreement with FONAFIFO 	10 additional points
<ul style="list-style-type: none"> • Forests in areas of 50 hectares or less 	25 additional points

FONAFIFO is also authorized to separately develop agreements for the provision of hydrological services that do not meet the prioritization criteria detailed above, but are instead developed in compliance with basin management plans.¹²⁵ This provides the opportunity to utilize the existing structure of the PPSA to contribute to basin plans, which would entail the identification of target areas, without FONAFIFO duplicating that prioritization process. Another exception is that where FONAFIFO receives funds from private or public institutions, an agreement with the funder may stipulate what ecosystem services are to be targeted and in what area.¹²⁶

Structure of incentive and payment terms and conditions. Incentive payments under the PPSA are made on a per hectare basis in accordance with standardized contract terms, set out in the operations manual. The Forestry Regulation also provides that land registered under the PPSA is exempt from real estate tax.¹²⁷ Payment levels and contract terms are at the discretion of MINAE, and incentive amounts for each modality are set out each year by Ministerial resolution

¹²⁴ Regulation of the Forestry Law supra (n 60), Art. 38, as amended by Decreto Ejecutivo N° 25721-MINAE Art. 2.

¹²⁵ Manual supra (n 61), Part 7.2.

¹²⁶ Regulation of the Forestry Law supra (n 60), Art. 1.

¹²⁷ Regulation of the Forestry Law supra (n 60), Art. 51.

(and prior to 2016, by executive decree).¹²⁸ The duration of contracts is 5 years for activities within the forest protection modality, and up to 16 years for reforestation activities, given the longer timeframe needed to achieve ES benefits. For reforestation modalities, 50 percent of the total payment is generally disbursed in the first year, presumably to account for greater start-up costs (to offset direct costs), and then spread out over the remaining years. For forest protection modalities, payments are disbursed evenly: 20 percent per year over the five years.¹²⁹ The incentive levels for each activity for 2017 are illustrated in the table below.

Table 4.2.3.3 - PPSA Incentive Levels (2017) in Colones/ US dollar conversion January 2018¹³⁰

Modality	Activity	Total payment per hectare or tree	Contract term
Restoration of forest cover	Reforestation with fast-growing species	C 643, 107 (US \$1138)	10 years
	Reforestation with slower growing species	C 757, 634 (US \$1341)	16 years
	Reforestation with species at risk	C 1, 136, 451 (US \$2011)	
	Natural regeneration	C 109, 106 (US \$193)	
	Agroforestry	C 931/ tree (US \$1.65)	
	Agroforestry with native species	C 1,379/ tree (US \$2.44)	
Maintenance of forest cover	Forest protection	C 170, 312 (US \$301)	5 years
	Forest protection to safeguard water resources	C 212, 891 (US \$377)	
	Sustainable forest management	C 133, 057 (US \$236)	

Studies of the PPSA suggest that incentive levels are influenced by various factors including the overall national budget, the estimated value of the ecosystem service provided by the forest, as well as the opportunity costs to the landowner associated with participating,¹³¹ although there is no legal requirement to consider specific factors. A recent survey examined the transaction and compliance costs of participation in the PPSA in a select region comparing ‘forest protection’ and ‘reforestation’ categories. Reforestation contracts had on average transaction and compliance costs of 98 percent of the PES payment, representing close calibration to compensation for the costs of participation. Transaction and compliance costs of forest protection contracts were on average 24

¹²⁸ This requirement is set out in the Regulation of the Forestry Law supra (n 60), Art. 38, as amended by Decreto Ejecutivo N° 25721-MINAE, Art. 2.

¹²⁹ R-541-2016-MINAE supra (n 62).

¹³⁰ *ibid.*

¹³¹ Porras et al. supra (n 1).

percent of the PES payment, suggesting higher levels of profit, and accounting for some amount of opportunity cost in addition to compensation.¹³²

Commentators have also suggested that alternative incentive models would be more efficient, such as sliding-scale incentives, reverse auctions, contingent valuation, payments based on level of threat, or other mechanisms for price differentiation.¹³³ Observing that wealthier landowners are motivated to participate in the PPSA mainly because of associated prestige, one author proposed higher payments to poorer landowners with higher opportunity cost, and non-financial incentives based on public recognition for wealthier landowners. The government has not shown interest in such alternatives, preferring to maintain discretion over incentive amounts.¹³⁴

The standardized PPSA contract for forest protection¹³⁵ includes a number of restrictions on land use, prohibiting any activity that alters the natural condition of the area, including the clearing of vegetation, the cutting of trees, the extraction of other forest products, and the development of agricultural or livestock activities. Participants are also required to take reasonable measures to prevent and control forest fires and to prevent illegal hunting. Amendments to the Forestry Regulation in 2016 create an exception to allow Indigenous Associations to carry out traditional activities within the PPSA area, including the establishment of subsistence crops, as long as they do not impact more than 2 percent of the area under contract.¹³⁶

PPSA contracts are registered in the public lands registry as a limitation on the property for the duration of its term.¹³⁷ The contract conditions are generally binding on future owners, unless a settlement agreement is reached with FONAFIFO to return a proportional amount of payments already disbursed. Any sale or assignment of land rights must be communicated to FONAFIFO before it can be executed.¹³⁸

Monitoring and enforcement. The standard PPSA contract includes a number of terms respecting monitoring and enforcement of contracts. Licensed foresters must be retained to inspect the property and verify contract compliance, each year for forest protection modalities.¹³⁹

¹³² *ibid.*

¹³³ Cody *supra* (n 99); Porras et al. *supra* (n 1).

¹³⁴ Matulis *supra* (n 98).

¹³⁵ Manual *supra* (n 61), Art. 12

¹³⁶ Regulation of the Forestry Law *supra* (n 60), Art. 39, as amended by Decreto Ejecutivo N° 25721-MINAE Art. 4.

¹³⁷ Manual *supra* (n 61), Art. 12

¹³⁸ Manual *supra* (n 61), Art. 12

¹³⁹ Manual *supra* (n 61), Art. 10

Inspections are carried out in accordance with a form and instructions set out in the manual.¹⁴⁰ Amendments to the Forestry Regulation in 2016 create an exception from this requirement for Indigenous associations, and provide that FONAFIFO will carry out monitoring directly.¹⁴¹ Participants also submit a signed form each year indicating actions taken to avoid forest fires and illegal hunting, and report on any abnormality in land use or condition,¹⁴² and must notify MINAE immediately of any changes respecting the land.¹⁴³

Contract terms allow MINAE and FONAFIFO personnel free access to properties for the purpose of verifying compliance,¹⁴⁴ and the operations manual provides that FONAFIFO may carry out periodic inspections.¹⁴⁵ MINAE, acting on its own or through FONAFIFO, may suspend payments for breach of contract, and request the reimbursement of payments granted, subject to general laws respecting contract dissolution and administrative fairness.¹⁴⁶ The parties may also terminate the contract by mutual agreement, where a settlement agreement is reached with FONAFIFO.

4.3 Ecuador's Socio Bosque Programme

4.3.1 Context and Overview of Legal Framework for PES

Environmental and economic development context. Ecuador is located in northwestern South America, with an area of about 256,000 square kilometres,¹⁴⁷ and a population of over 16.3 million in 2016.¹⁴⁸ It maintains a relatively high rural population, but with a steady trend towards urbanization: rural residents accounted for 36 percent in 2016, compared to 66 percent in 1960.¹⁴⁹ It has a High Human Development Index (ranked 89th in the world in 2015 according to the United Nations Development Programme),¹⁵⁰ with a GDP per capita of US \$6,018 in 2016, significantly below the OECD average of US \$36,881.¹⁵¹ Poverty persists in Ecuador, although there have been significant improvements since 2008, a year which marked a change in government and increased

¹⁴⁰ Manual supra (n 61), Annex 6.

¹⁴¹ Regulation of the Forestry Law supra (n 60), Art. 39, as amended by Decreto Ejecutivo N° 25721-MINAE, Art. 4.

¹⁴² Manual, Annex 6.

¹⁴³ Manual supra (n 61), Art. 12

¹⁴⁴ *ibid.*

¹⁴⁵ Art. 12

¹⁴⁶ Manual supra (n 61), Art. 11.

¹⁴⁷ Regulation of the Forestry Law supra (n 60), Art. 42.

¹⁴⁸ 'Surface Area' supra (n 2).

¹⁴⁹ 'Population, total' supra (n 3).

¹⁵⁰ 'Rural population' supra (n 4)

¹⁵¹ 'Human Development Data' supra (n 6).

¹⁵² 'GDP per capita' supra (n 7).

funding for social programmes, including Socio Bosque. By 2011, Ecuador ranked number one in the world for relative progress toward the Millennium Development Goals,¹⁵² and extreme poverty was reduced to 3.95 percent of the population by 2012, compared to 14.6 percent in 1991, while significant wealth disparities remain.¹⁵³ About 35 percent of the rural population was living below national poverty lines in 2014, an improvement from 51 percent in 2011.¹⁵⁴ Ecuador's economy relies heavily on exports of oil, as well as products such as bananas and shrimp, and public spending was cut back following the reduction in oil prices in 2016.¹⁵⁵

Ecuador is divided by both equatorial and hemispheric lines, creating four distinct regions (the Amazon, Andes, Pacific coast and Galapagos Islands) and resulting in exceptional biodiversity: with just 0.2 percent of the earth's total area, it holds 18 percent of all known bird species, 18 percent of orchids, 10 percent of amphibians and 8 percent of mammals, placing it in the top 17 mega-diverse countries.¹⁵⁶ Many of these species depend on Ecuador's forests,¹⁵⁷ which include montane forest, dry forest, and humid tropical forest (making up the vast majority), with large intact tracts that are of global significance to conservation.¹⁵⁸ Páramos represent another critically important ecosystem, located in Ecuador's high Andes, typified by unique tropical montane vegetation, wet grasslands, lakes, lagoons, and spongy soil.¹⁵⁹ Páramos provide a buffer during the rainy season, maintaining groundwater recharge and surface water reserves that deliver water in the dry season to settlements downstream.¹⁶⁰ Ecuador has one of the most abundant water supplies in Latin America. However, rainfall is highly concentrated in the Amazon region, with

¹⁵² MDG Progress Index: Gauging Country-Level Achievements (Center for Global Development) <<https://www.cgdev.org/page/mdg-progress-index-gauging-country-level-achievements>> accessed 8 January 2018.

¹⁵³ 'MDG Country Progress Snapshot: Ecuador' (United Nations Statistical Division) <<http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2015/Snapshots/ECU.pdf>> accessed 8 January 2018.

¹⁵⁴ 'Rural poverty' supra (n 9).

¹⁵⁵ 'The World Bank in Ecuador' (the World Bank) <<http://www.worldbank.org/en/country/ecuador/overview#1>> accessed 15 January 2018.

¹⁵⁶ 'Ecuador – Country Profile' (Convention on Biological Diversity Country Profiles) <<https://www.cbd.int/countries/profile/default.shtml?country=ec>> accessed 15 January 2018.

¹⁵⁷ F de Koning et al. 'Bridging the gap between forest conservation and poverty alleviation: the Ecuadorian Socio Bosque programme' (2011) 14(5) *Environmental Science & Policy* 531.

¹⁵⁸ Ecuador – Country Profile supra (n 156).

¹⁵⁹ D Russi et al. *The Economics of Ecosystems and Biodiversity for Water and Wetlands* (Ramsar Secretariat 2013).

¹⁶⁰ W Buytaert and B De Bièvre 'Water for cities: The impact of climate change and demographic growth in the tropical Andes' (2012) 48(8) *Water Resources Research*.

water flowing into the great Amazon Basin and away from the more arid Andes region where population density is highest.¹⁶¹

Ecuador maintains high forest cover but also had one of the highest deforestation rates in Latin America around the time Socio Bosque was created in 2008.¹⁶² The Ecuadorian government cites declines in deforestation since 2009, attributed in part to Socio Bosque,¹⁶³ while satellite data on tree cover loss (not necessarily from deforestation) shows a more erratic pattern, with general declines until 2015, but a higher rate of loss in 2016.¹⁶⁴ According to satellite images, tree cover was about 61 percent of the country in 2010, and has declined about 3 percent since then. Deforestation is still the main threat to biodiversity, driven by expansion of agriculture, urban development, logging (much of it illegal), and mining and petroleum development.¹⁶⁵

The National Forest Plan, established in 2012, emphasizes ecosystem services provided by forests, including case studies estimating the economic value of ecosystem services *lost* due to deforestation between 1990 and 2012: totalling US \$2.4 billion, taking into account the value of carbon sequestration, flow regulation, drinking water provision, timber, firewood, and wild protein (terrestrial and fish fauna).¹⁶⁶ These figures are used to justify public investment in a plan to reforest 1 million hectares over 20 years, including restoration of natural habitat as well as development of plantations and agroforestry to offset pressures on intact forests,¹⁶⁷ in addition to forest protection under Socio Bosque. Between 2008 and 2015, approximately 1.5 million hectares of forests and páramos were protected via 2,775 agreements under Socio Bosque, representing a total investment of US \$55.6 million.¹⁶⁸ Ecuador is a UN REDD+ Programme partner, and is implementing REDD+ through Socio Bosque.¹⁶⁹

¹⁶¹ Estrategia Nacional de Agua Potable y Saneamiento, Secretaria del Agua [National Strategy for Drinking Water and Sanitation] (Gobierno de la Republica de [Government of the Republic of] Ecuador 2016).

¹⁶² Plan Nacional de Restauración Forestal [National Forest Restoration Plan] 2014-2017, adopted by Accord of the Minister of Environment No. 041, 22 March 2014.

¹⁶³ *ibid.*

¹⁶⁴ 'Ecuador' (Global Forest Watch) <<https://www.globalforestwatch.org/country/ECU>> accessed 5 January 2018.

¹⁶⁵ National Forest Restoration Plan *supra* (n 162).

¹⁶⁶ *ibid.*

¹⁶⁷ 'Incentivo a la Restauración Forestal' [Forest Restoration Incentive], adopted by accord of the Minister of the Environment No. 065, 16 April 2015.

¹⁶⁸ 'Resumen del Programa Socio Bosque [Summary of the Socio Bosque Programme] – 2016' (MAE 2017).

¹⁶⁹ Plan de Acción REDD+ del Ecuador "Bosques para el Buen Vivir" [National Action Plan for REDD+ "Forests for a Good Life"] (2016-2025) (MAE 2016).

Formal property rights are not well established in parts of Ecuador, with an estimated 12 percent of rural properties lacking title and 60 percent of registration records being outdated as of 2011.¹⁷⁰ While the government is making efforts (including as part of Socio Bosque and REDD+ readiness) to secure title among marginalised communities, uncertain title remains a significant challenge and available data on tenure is conflicting.¹⁷¹ Indigenous territories cover about 20 percent of the country's total land area. About 40 percent of forests are legally protected under the National System of Protected Areas, with the remaining 60 percent under control of private individuals, communities and Indigenous peoples (some of which are enrolled in Socio Bosque).¹⁷² Illegal land clearing by settlers, communities and logging companies remains a challenge indigenous territories and national protected areas.¹⁷³

Drinking water is sourced mainly from surface water sources, while an estimated 70 percent of surface waters below 2,800 metres is unsuitable for drinking without treatment. Pollutants include nutrients, pathogens, sediment, and hydrocarbons and other chemicals, with many industries discharging effluent directly into fresh water. Twelve reservoirs serve urban populations, and many, such as the capital city Quito, rely on high altitude sources in páramo ecosystems. There is some reliance on dug wells in rural areas.¹⁷⁴ In 2015, while a high percent of the population had access to basic water services, only 56 percent of the rural population and 85 percent of the urban population had access to basic and safely managed drinking water services in 2015.¹⁷⁵ Progress towards improved water and sanitation infrastructure has slowed in the past decade, and significant challenges remain. A National Strategy for Water and Sanitation, developed in 2016, makes links between water management challenges and ecosystem services, and includes the protection and restoration of ecosystems of importance to water (specifically forests, mountains, wetlands, rivers, lakes and aquifers) among its objective for 2020.¹⁷⁶

¹⁷⁰ 'USAID Country Profile - Property Rights and Resource Governance: Ecuador' (USAID 2016) <https://www.land-links.org/wp-content/uploads/2016/09/USAID_Land_Tenure_Ecuador_Profile.pdf> accessed 8 January 2018.

¹⁷¹ 'REDD Ecuador' (the REDD desk) <<https://theredddesk.org/countries/ecuador>> accessed 9 January 2018.

¹⁷² 'Ecuador – Country Profile' supra (n 156).

¹⁷³ 'REDD Ecuador' supra (n 171).

¹⁷⁴ H Cabrera, M Garcés and P Paredes 'Proyecto de Desarrollo de Capacidades para el Uso Seguro de Aguas Servidas en Agricultura' ['Project for Developing Capacity for Sustainable Water Use for Agriculture] (FAO, WHO, UNEP and others 2012).

¹⁷⁵ 'Ecuador' (JMP WASH Data) <<https://washdata.org/data#!/ecu>> accessed 14 April 2018.

¹⁷⁶ National Strategy for Drinking Water and Sanitation supra (n 161).

Legal and institutional context. Ecuador has a civil law legal system. Its 2008 constitution, approved by referendum with a wide margin of public support, marks the 20th in the country's history.¹⁷⁷ It declares that Ecuador is a democratic republic and unitary state, governed using a decentralized approach.¹⁷⁸ There is separation of legislative, executive and judicial powers, with law-making powers vested in the Legislative Assembly.¹⁷⁹ The President and Ministers have powers to issue a variety of subordinate laws pursuant to statutes, including decrees, regulations and accords.¹⁸⁰ The constitution also recognizes autonomous decentralized governments and municipal governments.¹⁸¹

The 2008 constitution was an extensive rewrite, supporting wide-reaching reforms to reverse the neoliberal policies that had dominated the preceding two decades, aiming to address issues of concentrated wealth, marginalized rural and Indigenous people, and environmental degradation.¹⁸² Indigenous worldviews deeply influenced the text,¹⁸³ including repeated references to *sumak kawsay*, an Indigenous concept that is defined in the constitution's preamble as 'a new way of citizenship that embraces diversity and harmony with nature in order to live well'.¹⁸⁴ Provisions related to the environment are extensive, including: public rights to a healthy environment¹⁸⁵; existential rights of nature¹⁸⁶; and obligations of the state to protect natural heritage, including through the creation of financial incentives.¹⁸⁷ The constitution directly addresses ecosystem services, declaring that ES shall not be subject to appropriation, and that use and delivery of ES is subject to state regulation.¹⁸⁸ The Environmental Management law elaborates the framework for environmental protection, providing for shared responsibilities between the

¹⁷⁷ Constitution of the Republic of Ecuador of 2008 (translated by Political Database of the Americas, Georgetown University).

¹⁷⁸ *ibid*, Art. 1.

¹⁷⁹ *ibid*, Art. 132.

¹⁸⁰ *ibid*, Art. 425.

¹⁸¹ *ibid*, Art. 238.

¹⁸² M Becker, 'Correa, Indigenous Movements, and the Writing of a New Constitution in Ecuador' (2011) 176(38) *LAP* 47; Amy Kennemore and Gregory Weeks, 'Twenty-First Century Socialism? The Elusive Search for a Post-Neoliberal Development Model in Bolivia and Ecuador' (2011) 30(3) *Bulletin of Latin American Research* 267.

¹⁸³ *ibid*.

¹⁸⁴ Constitution of Ecuador *supra* (n 177), Preamble.

¹⁸⁵ Constitution of Ecuador *supra* (n 177), Art. 14.

¹⁸⁶ Constitution of Ecuador *supra* (n 177), Art. 71.

¹⁸⁷ Constitution of Ecuador *supra* (n 177), Art. 3.7.

¹⁸⁸ Constitution of Ecuador *supra* (n 177), Art. 74.

Ministry of Environment (*Ministerio Ambiental Ecuador*, MAE), and decentralized environmental authorities and municipalities.¹⁸⁹

The constitution also sets out detailed provisions on water including: a declaration that water is national patrimony;¹⁹⁰ a duty on the state to guarantee the conservation and integrated management of water resources, watersheds and ecological flows associated with the water cycle; a statement that all activities affecting the quality and quantity of water are subject to regulation, especially in aquifer recharge zones;¹⁹¹ and a statement that a public water authority shall be responsible for water planning and regulation based on an ecosystem approach.¹⁹² This function is fulfilled by the National Water Secretariat (*Secretaria Nacional del Agua*, SENAGUA), in accordance with the national Water Law, which elaborates a framework for water management and basin planning in partnership with decentralized governments and MAE.¹⁹³ A dedicated sub-secretariat under SENAGUA is responsible for drinking water and sanitation policy. Water services are generally provided by municipalities in urban areas, and by water boards in rural areas, however, there are many public bodies with overlapping roles. The 2016 National Strategy for Water and Sanitation focusses largely on the need for better coordination and governance.¹⁹⁴

The National Secretariat of Planning and Development (*Secretaria Nacional de Planificacion y Desarrollo*, SENPLADES) carries out a centralized planning and accountability function, allocating budgets and overseeing activities of the MAE and other Ministries. SENPLADES establishes National Development Plans by executive decree every four years, which direct priorities for public spending, the actions of national government authorities and coordination with decentralized governments.¹⁹⁵

Overview of the legal and policy framework for payments for ecosystem services.

Ecuador's National Development Plan (*Plan Nacional de Desarrollo*, PND) for 2007-2010 mandated the creation of a forest conservation incentives programme to protect ecosystem services.¹⁹⁶ To

¹⁸⁹ Ley de Gestion Ambiental [Environmental Management Law], 214 of 2004.

¹⁹⁰ Article 318

¹⁹¹ Article 411.

¹⁹² Article 412.

¹⁹³ Ley Organica de Recursos Hidricos, Usos y Aprovechamiento del Agua [Organic Law for Water Resources and Use], 305 of 2014.

¹⁹⁴ National Strategy for Drinking Water and Sanitation supra (n 161).

¹⁹⁵ 'Instrumentos de Planificacion [Planning Instruments : National Development Plans]' (Senplades) <<http://instrumentosplanificacion.senplades.gob.ec/plan-nacional-de-desarrollo>> accessed 1 March 2018.

¹⁹⁶ Plan Nacional de Desarrollo [National Development Plan] 2007-2010 (Senplades 2007).

fulfill this mandate, the *Proyecto Socio Bosque* (Forest Partners Project, ‘Socio Bosque’) was established by Ministerial accord in 2008¹⁹⁷ and an administrative order by SENPLADES designated funds to the MAE for its implementation over the eight-year period from 2008 to 2016.¹⁹⁸ Detailed rules were elaborated in a series of subsequent accords, which were consolidated into an operations manual in 2012.¹⁹⁹ Socio Bosque is consistent with provisions of the constitution dealing with ecosystem services and the role of the state to provide financial incentives for conservation, however, it does not have a permanent statutory basis. The programme remains active, although it is uncertain whether additional funding will be extended for new contracts.

Socio Bosque explicitly pairs poverty alleviation and ecosystem conservation. The Ministerial accord sets out three explicit programme objectives: to conserve native forests, páramos and other native vegetation; to reduce greenhouse gas emissions caused by deforestation; and to improve the standard of living for rural populations.²⁰⁰ It is described as a ‘conservation incentive’, rather than a ‘payment for ES’, but is based explicitly on an ES approach. The MEA’s stated purpose is to benefit all Ecuadorians indirectly via the provision of ecosystem services and to benefit participants directly via incentive payments for conservation.²⁰¹ Detailed studies on deforestation and ecosystem services, such as those informing the 2012 National Forestry Plan, were not used in developing Socio Bosque at its inception. The political will to develop this data coincided with the initiation of the programme, and a deliberate decision was made to avoid a lengthy research process, in favour of expediency of implementation.²⁰²

The design process for Socio Bosque proceeded rapidly, with less than a year between the mandate in the 2007-2010 PND and implementation. The design drew on international expertise, including the national PES programmes in Costa Rica and Mexico,²⁰³ as well as on existing PES schemes in Ecuador. These included a pilot PES project led by the NGO Conservation International for biodiversity conservation (which was later assimilated into Socio Bosque), and an ongoing

¹⁹⁷ Acuerdo Ministerial N° 169 Creación Socio Bosque [Accord No. 169 - Establishing Socio Bosque] (14 noviembre 2008).

¹⁹⁸ Oficio N° SENPLADES- SIP-DAP-2011-556.

¹⁹⁹ Acuerdo Ministerial N° 130 Manual Operativo [Operations Manual] (14 de septiembre 2012).

²⁰⁰ Accord No. 169 supra (n 197), Art. 1.

²⁰¹ ‘Socio Bosque’ (Ministerio del Ambiente [Ministry of Environment]) <<http://sociobosque.ambiente.gob.ec/node/819>> accessed 12 January 2018.

²⁰² National Forest Restoration Plan supra (n 162).

²⁰³ J Fehse, ‘Private conservation agreements support climate action: Ecuador’s Socio Bosque programme’ *Inside Stories on Climate Compatible Development* (Climate and Development Knowledge Network 2012).

municipal-led PES project to protect privately-owned areas of importance to drinking water.²⁰⁴ In at least one other case, a pre-2008 PES scheme for watershed protection, led by a local NGO, was also assimilated into Socio Bosque.²⁰⁵

While subsequent PNDs have continued to emphasize the socio-economic benefits of conservation, the most recent PND for 2017-2021 states, for the first time, that efforts to reduce deforestation should be a shared responsibility with the private sector, without dependence solely on government, in order to be sustainable over the long term.²⁰⁶ Given that the constitution establishes the role of the state in regulating ES and specifically refers to conservation incentives, the potential role of private actors in PES is uncertain. While the law does not explicitly prohibit 'private' PES organized by NGOs, companies, or local governments, to the extent that any scheme 'appropriates' rights to ES, this would be prohibited by the constitution.²⁰⁷

4.3.2 PES Actors, Administration and Oversight

Administration and oversight. Socio Bosque was created by and is centrally managed by the MAE. The ministerial accord establishing the programme cites the various constitutional provisions respecting the role of the state in managing ES,²⁰⁸ and declares that the MAE shall act on behalf of the state in administering conservation incentives.²⁰⁹ The MAE is responsible for determining the level of incentives, how ecosystem services are targeted, and the terms and conditions that are included in standardized contracts, all of which are established in further ministerial accords and set out in the 2012 operations manual.²¹⁰

The MAE has a dedicated Socio Bosque agency, with staff in the central office in Quito, as well as regional offices to receive and verify applications within each region.²¹¹ A Socio Bosque

²⁰⁴ L Raes and P Mohebalian 'TEEBcase: The Socio Bosque Programme for rainforest and páramo conservation, Ecuador' (TEEB 2014).

²⁰⁵ C Schloegel, 'Payments for the Protection of Watershed Services: A Potential Conservation Tool for Improving Protection of 'Paper Parks' in Latin America?' in L. Keenan (ed), (2010) 10(1) *Mountain Forum Bulletin*.

²⁰⁶ Plan Nacional de Desarrollo [National Development Plan] 2017-2021 (Senepalades, 2017).

²⁰⁷ At least one 'private' PES scheme continues to operate in Ecuador: PROFAFOR, a private Ecuadorian company has operated tree plantation and reforestation PES projects since 1993, funded by a consortium of Dutch power companies in order to offset their emissions (see 'Queines somos [About us]' (Profafor) <<http://www.profafor.com/portal/es/quienes-somos>> accessed 3 January 2018; S Wunder, and M Alban' Decentralized payments for environmental services: The cases of Pinampiro and PROFAFOR in Ecuador' (2008) 65(4) *Ecological Economics*, 685.

²⁰⁸ Accord No. 169 supra (n 197), Preamble.

²⁰⁹ Ibid, Art. 3.

²¹⁰ Ibid, Art. 5.

²¹¹ 'Socio Bosque' supra (n 201).

manager is assigned as the sole person authorized to represent the MAE in entering into contracts with landowners, and with direct accountability for the management of funds and the monitoring and enforcement of contracts.²¹² The MAE publishes an annual report of its expenditures on all programmes, including Socio Bosque, pursuant to transparency and access to information laws.²¹³ High-level oversight is provided by SENPLADES, which reviews MEA annual reports based on criteria of social participation, equity and transparency.²¹⁴

Beneficiaries, buyers and funding. The MAE is responsible for management of funds for Socio Bosque and must invest those funds exclusively to activities that further the objectives of programme, as set out in the Ministerial accord.²¹⁵ A total of US \$98.9 million was designated to the MAE by order of SENPLADES, for the eight-year period from 2008 to 2016. Of this, about US \$82 million was allocated from public funds as part of the MAE operations budget, and US \$17 million was directed to Socio Bosque from a grant from the German Development Bank.²¹⁶ The MAE's annual report published in September 2017 indicates that about 90 percent of that funding had been allocated, and that the deadline to allocate remaining funds was extended until at least December 31, 2017 (meaning there will not be funds for new contracts after that date, but funds allocated to contracts will be set aside to meet commitments over the term of those contracts).²¹⁷ At the time of writing in May 2018, no additional government funding had been designated for new contracts beyond existing commitments, while the programme remains active in managing existing contracts.²¹⁸

A total of \$11 million was separately designated to the MAE specifically for the implementation of Socio Bosque towards REDD+ commitments, over the six-year period between 2013 and 2019. The MAE's September 2017 report indicates that 75 percent of those funds had been allocated.²¹⁹ In 2017, Ecuador also received the first disbursement of US \$8 million towards a

²¹² Consolidated Operations Manual supra (n 199), Art. 1.

²¹³ Ley Organica de Transparencia y Acceso a la Informacion Publica [Organic Law for Transparency and Access to Information], Law 337 of 2004, Art. 7.

²¹⁴ Ibid.

²¹⁵ Accord No. 169 supra (n 197), Art 6.

²¹⁶ Senplades Order 556 of 2011.

²¹⁷ Ficha Informativa de Proyecto [Project Information Report] (Ministerio del Ambiente [Ministry of Environment] 2017) <<http://www.ambiente.gob.ec/wp-content/uploads/downloads/2017/02/SOCIO-BOSQUE.pdf>> accessed 20 January 2018.

²¹⁸ 'Proyecto Socio Bosque' (Ministerio del Ambiente y Socio Bosque) <<http://sociobosque.ambiente.gob.ec/>> accessed 22 May 2018.

²¹⁹ Ibid.

US \$84 million commitment from the United Nations Green Climate Fund to support REDD+, some of which will be implemented via incentives programmes.²²⁰

While future funding is uncertain, the SENPLADES order specified that the original funding included the costs of monitoring for the duration of contracts. The majority (70 percent) of funds were to be applied towards contracts (including monitoring), with the remainder covering ES research, technical and administrative costs.²²¹ Because there is no legally-secured ongoing source of revenue for the programme, such as a dedicated tax, future funding is dependent on political will and feasibility within the national budget. MAE Socio Bosque, the MAE indicated that in 2016 non-government sources contributed 23 percent of the annual programme expenditures – with external contributions from General Motors Ecuador and the NGO Conservation International. The MAE proposed a sustainable funding strategy for Socio Bosque, stating the objective to secure 50 percent contributions from non-government sources, including the private sector, by 2018, while information on the status of these efforts is not available.²²²

The desire to seek external funding sources for Socio Bosque is likely linked to a downturn in Ecuador's economy since the drop in oil prices in 2015. This resonates with the statement in the 2017-2021 PND, that efforts to reduce deforestation are a shared responsibility and should not rely wholly on government funding. The 2017-2021 PND was also the first since the election of a new president (although under the same political party that has held power since 2008). Local news sources reported disbursements to Socio Bosque participants were delayed by over 6 months in 2015, reportedly due to the impacts of falling oil prices on the national budget, combined with the costs of emergency response to an earthquake that year. Differing opinions were expressed in the news by stakeholders during this period, with some calling on the government to secure permanent funding for the programme, and others arguing that the incentive payments should be considered seed money to develop environmentally and financially sustainable activities on the land, and that the expectation of a lifetime income was not viable.²²³

²²⁰ 'Ecuador to receive over US\$80 million to curb deforestation' (UPND Latin American and the Caribbean) <<http://www.latinamerica.upnd.org/content/rblac/en/home/presscenter/pressreleases/2017/07/04/ecuador-to-receive-over-us-80-million-to-curb-deforestation.html>> accessed 2 April 2018.

²²¹ Senplades Order 556 of 2011.

²²² *Estrategia de Sostenibilidad Financiera del Programa Socio Bosque [Sustainable Funding Strategy for Socio Bosque]* (MAE 2015).

²²³ 'El Ministerio del Ambiente se pone al día con el pago de Socio Bosque [The Ministry of Environment gets up to date on Socio Bosque payments]' (Diario El Telegrafo, 29 March 2017)

Eligibility for payments. The Ministerial accord establishing Socio Bosque states that participation must be voluntary on the part of landowners, and selected on the basis of applications.²²⁴ Applicants may be natural persons, communities or indigenous tribes and must have title to the land.²²⁵ Owners of plantation forests are explicitly excluded from the programme.²²⁶ Requirements for participation include proof of land title, certificate of tax payment, and completion of a professional land survey.²²⁷ Community applicants must also show approval of the community to enter the programme, demonstrating that any internal rules and procedures applicable within communities and Indigenous groups have been respected.²²⁸ Socio Bosque covers the cost of land surveying for applicants with land areas less than 50 hectares. For areas above 50 hectares the costs are paid by the applicant, or may be paid for by Socio Bosque and deducted from the amount of the incentive.²²⁹

Socio Bosque holds a call for applications at least once per year, which the MAE is required to advertise by various media, including visits to rural areas and participation in local community events.²³⁰ The application process has four stages: i) the submission of completed forms and supporting documents at regional offices; ii) the screening of applications against priority geographic areas (based on socio-economic and ES indicators, further described in part 4.2.3.1); iii) site visits by Socio Bosque technicians to verify the status of land for priority applications; iv) the selection of properties and completion of contracts.²³¹

MAE reports entering into about 2,800 agreements under Socio Bosque between 2008 and 2015, providing funds to more than 187 thousand people (since most were group agreements) and covering 1.5 million hectares.²³² At least one case study reported that prospective participants received support by MAE to become eligible for Socio Bosque, which improved outcomes for marginalized communities. This included financial and legal support to assist in proving land titles that were unregistered, and defending communal land titles, as well as investments in technical

<<http://www.eltelegrafo.com.ec/noticias/sociedad/4/el-ministerio-del-ambiente-se-pone-al-dia-con-el-pago-de-socio-bosque>> accessed 8 January 2018.

²²⁴ Accord No. 169 supra (n 197), Art 2.

²²⁵ Consolidated Operations Manual supra (n 199), s. 5.

²²⁶ Accord No. 169 supra (n 197), Art. 4.

²²⁷ Consolidated Operations Manual supra (n 199), s. 5.

²²⁸ Consolidated Operations Manual supra (n 199), s. 5.

²²⁹ Consolidated Operations Manual supra (n 199), s. 3.3.

²³⁰ Accord No. 169 supra (n 197), s. 6.

²³¹ Accord No. 169 supra (n 197), s. 7.

²³² Sustainable Funding Strategy for Socio Bosque supra (n 222).

capacity to monitor land.²³³ Other commentary also indicates Socio Bosque has been effective in both ecosystem conservation and poverty alleviation efforts, with strong support from indigenous and other rural communities.²³⁴

4.3.3 PES Design

Targeting ecosystem services. The Ministerial accord establishing Socio Bosque sets the broad parameters of the programme: to conserve native forests, páramo and other native vegetation, with the specific goal of reducing carbon emissions from deforestation (along with poverty alleviation).²³⁵ The operations manual elaborates on the concept of ecosystem services, and defines three categories of ES to be targeted: (i) carbon storage, (ii) water cycle regulation and (iii) habitat for biodiversity.²³⁶ The manual defines eligible ‘native forests’, ‘páramo’ and ‘native vegetation’ as plant formations consisting of native species resulting from the natural process of ecological succession. Secondary forests may be considered if they have been in a state of regeneration for over 20 years and have not been actively managed, and commercial forest plantations are explicitly excluded. Forested areas must provide at least two of the three ecosystem services to be considered (whereas páramos or other vegetated areas could provide only water services, for example).²³⁷

There is no set number of hectares or amount of funding that must be disbursed each year, allowing MEA discretion as to how many new contracts are accepted each year. The selection process for applications is carried out in phases, focusing on priority regions identified by MEA.²³⁸ From within the target region, applications are further prioritized by Socio Bosque technicians, based on a formula that takes into account the following variables, which are detailed in the operations manual: the level of threat to the area, the importance of the area to providing ecosystem services, and the poverty level of applicants.

For forests, the assessment of level of threat to the area is based on i) proximity to access roads and navigable waters based on MAE’s available maps and ii) historical patterns of

²³³ K Wendland et al., ‘Rewards for Environmental Services and Collective Land Tenure: Lessons from Ecuador and Indonesia’ in L Keenan (ed) (2010) 10(1) *Mountain Forum Bulletin*.

²³⁴ de Koning et al. supra (n 157).

²³⁵ Accord No. 169 supra (n 197), Art. 1.

²³⁶ Accord No. 169 supra (n 197), Art. 3.1 (b).

²³⁷ Consolidated Operations Manual supra (n 199), s. 2.2.

²³⁸ Accord No. 169 supra (n 197).

deforestation based on data gathered between 1990 and 2008.²³⁹ For páramos, the threat assessment involves three factors: i) proximity to access roads and navigable waters; ii) regional population density iii) and rate of land conversion in the surrounding region.²⁴⁰

For forests, assessment of the importance of the area to providing ecosystem services is based on i) Importance to protection of biodiversity, based on data from the National Protected Areas System, with priority given to forest types with low representation within national protected areas; ii) Generation and regulation of hydrological resources; iii) Carbon storage, calculated based on plant biomass.²⁴¹ For páramos, consideration is given to i) hydrological resources, including annual rainfall and seasonal variability and demand for water downstream for domestic use, irrigation and hydroelectricity; ii) carbon storage of soil, to be factored in only where available data exists; iii) biodiversity protection, again with priority given to those that are underrepresented in the national system of protected areas; iv) connectivity, to create corridors with national protected areas and forested areas under protection of Socio Bosque.²⁴²

Assessment of poverty levels is the same for both forests and páramo applicants²⁴³, based on data from national Integrated Social Development Indicators System. Priority is give to applicants in the bottom 65th percentile. The goal of engaging the poorest forest landholders may mean that areas with low threat of actual degradation will end up included in the programme. The full points scale is elaborated below, based on the formula: Priority index = threat level variable + ecosystem services variable + poverty variable.

²³⁹ Consolidated Operations Manual supra (n 199), s. 3.1 (a).

²⁴⁰ *ibid.*

²⁴¹ Consolidated Operations Manual supra (n 199), s. 3.1 (b).

²⁴² *ibid.*

²⁴³ Consolidated Operations Manual supra (n 199), ss. 3.1 (b) and 3.2 (b).

Table 4.3.3.1 - Socio Bosque Application Prioritization Matrix

Priority index	Threat level variable	Ecosystem Services variable			Poverty variable
		Biodiversity habitat	Hydrological services	Carbon storage	
Forests (out of 22)	Low: 3 pts Medium: 6 pts High: 9 pts	Very high: 4 High: 3 Medium: 2 Low: 1	High: 3 Medium: 2 Low: 1	High: 3 Medium: 2 Low: 1	Below 65% on poverty index: 3 Above 65% on poverty index: 0
Páramo (out of 18)	<i>Proximity to access roads and navigable waters:</i> High: 1 Low: 0 <i>Population density:</i> High: 3 Medium: 2 Low: 1 <i>Rate of conversion of land:</i> High: 2 Medium: 1 Low: 0	High: 2 Medium: 1 Low: 0 <i>Connectivity:</i> Connected: 1 Not connected: 0	<i>Seasonal distribution:</i> High: 1 Low: 0 <i>Total precipitation:</i> High: 1 Low: 0 <i>Downstream demand:</i> High: 4 Medium: 2 Low: 0	n/a	Below 65% on poverty index: 3 Above 65% on poverty index: 0

Structure of incentive and payment terms and conditions. Incentive payments under Socio Bosque are provided in accordance with the terms of a standard-form contract, set out in the operations manual. The term of all contracts is 20 years,²⁴⁴ requiring participants to make a long-term commitment to conservation and requiring MAE to administer the programme to ensure compliance with contract conditions over this term. The manual states that contracts may be renewed (although this is presumably subject to funding to continue incentives). Studies of the programme indicate that landowners have considered the 20-year term a benefit for long-term secured income rather than a deterrent to participation.²⁴⁵ The Socio Bosque contract is registered as an encumbrance on the land and is binding on future owners.²⁴⁶

Payments are made directly to participants, based on number of hectares per year, transferred in two installments each year in May and October.²⁴⁷ Since contracts are a standard form, there is no negotiation or tailoring of the agreement to individual circumstances. However,

²⁴⁴ Consolidated Operations Manual supra (n 199), s. 9.1.

²⁴⁵ de Koning et al. supra (n 157).

²⁴⁶ Consolidated Operations Manual supra (n 199), ss. 9.5 and 12.

²⁴⁷ Consolidated Operations Manual supra (n 199), s. 4.2.1.

the payment structure varies significantly depending on the size of the area and whether the participant is an individual or community, in order to optimize the incentive for efficiency and achieving Socio Bosque's goal of reducing poverty. A single landowner cannot apply to receive an incentive for more than one property if the property was subdivided after 2008.²⁴⁸ This rule prevents applicants from taking advantage of the higher price per hectare for smaller properties.

Payment amounts range from US \$60 per hectare per year for areas less than 20 hectares to US \$0.70 per hectare per year for areas over 10 000 hectares²⁴⁹, with higher levels of payments for smaller landholders in line with poverty alleviation goals. According to a cost/benefit analysis of Socio Bosque carried out by MAE, based on these incentive amounts, for every dollar paid to participants, the value of ecosystem services generated is US \$102 for humid forests, US \$28 for dry forests, and US \$43 for paramos.²⁵⁰ The full incentive schedule is shown in the table below.

Table 4.3.3.2 – Socio Bosque Incentive Levels

Type of landowner	Size of Area (hectares)	USD / hectare / year
1. Natural person owning 20 hectares or less of forest or paramo	1 to 20	\$60
2. Natural person owning more than 20 hectares of forest or paramo	1 to 50	\$30
	51 to 100	\$20
	101 to 900	\$10
	901 to 3000	\$5
	3001 to 10 000	\$2
	10 001 and above	\$0.50
3. Community, indigenous tribe or other legal person owning paramo	1 to 50	\$60
	51 to 100	\$40
	101 to 900	\$20
	901 to 3000	\$10
	3001 to 10 000	\$4
	10 001 and above	\$1
4. Community, indigenous tribe or other legal person owning forest	1 to 50	\$35
	51 to 100	\$22
	101 to 900	\$13
	901 to 3000	\$6
	3001 to 10 000	\$3
	10 001 and above	\$0.70

Socio Bosque amounts are considerably lower than offered by Costa Rica's PPSA, reflecting lower land values and lower income in rural Ecuador. Also, where commissions on PPSA payments

²⁴⁸ Consolidated Operations Manual supra (n 199), s. 12.

²⁴⁹ Consolidated Operations Manual supra (n 199), s. 4.2.1.

²⁵⁰ Sustainable Funding Strategy for Socio Bosque supra (n 222).

are taken by FONAFIFO for contract administration, NGO intermediaries for technical support, and foresters for compliance verification, all these services are provided to participants by the Socio Bosque team at no charge.

Contractual obligations prohibit such things as cutting, burning, intensive grazing and commercial or sport hunting within the area under conservation. More generally, any changes in land use or activities that threaten to disturb natural processes, biodiversity, natural hydrological conditions or that reduce carbon storage are also prohibited.²⁵¹ Participants are also required to complete individual or community investment plans as a condition of receiving incentives, which entails completing a form setting out how the payments will be spent.²⁵² Some case studies have indicated this tool has successfully supported capacity development towards poverty alleviation goals.²⁵³ While there are no prescriptive rules on spending, some experiences have indicated that MAE encourages investments in education, health care and infrastructure development.²⁵⁴ The investment plans also provide transparency in benefit sharing, to reduce the risk of misinformation and exclusion within communities.²⁵⁵

Anecdotally, local news sources reported that when payments were temporarily suspended in 2015, participants did not abandon the programme, but relied on alternative sources of funding (ecotourism, sustainable harvesting of forest products), that did not breach contract terms.²⁵⁶ During 2015, MAE also launched a new capacity-building programme called ‘bio-entrepreneurships’ to support sustainable agro-forestry development within Socio Bosque. This is described as an additional, non-monetary incentive for participants, which will contribute to the sustainability of Socio Bosque.²⁵⁷

Monitoring and enforcement. The Socio Bosque operations manual includes several provisions on monitoring and enforcement that are to be included in the standard-form contracts. Participants must sign an affidavit every two years swearing that land remains under conservation and submit a report on use of the funds in accordance with the investment plan.²⁵⁸ Socio Bosque officials may

²⁵¹ Consolidated Operations Manual supra (n 199), s. 8.

²⁵² *ibid.*

²⁵³ de Koning et al. supra (n 157).

²⁵⁴ Fehse supra (n 203).

²⁵⁵ de Koning et al. supra (n 157).

²⁵⁶ Diario El Telegrafo, supra (n 223).

²⁵⁷ Sustainable Funding Strategy for Socio Bosque supra (n 222).

²⁵⁸ Consolidated Operations Manual supra (n 199), s. 8.

request other documents if deemed necessary.²⁵⁹ The MAE reserves the right to inspect properties at any time. The MAE will also monitor via satellite images, aerial photographs and any other technology that may be available.²⁶⁰

Payment of an installment under a Socio Bosque contract may be withheld for failure to comply with any of the contractual conditions, including reporting requirements. The contract may be terminated for failure to comply with land use requirements, or following refusal of three consecutive installments resulting from failure to comply with other conditions, or at the discretion of the MAE. If a contract is terminated, the funds or a portion of the funds must be returned by participants to the MAE: 100 percent if the contract is breached within the first 5 years of the programme; 75 percent for a breach between year 6 and 10; 50 percent for a breach within year 11 and 15; and 25 percent for a breach between year 16 and 20.²⁶¹

4.4 Discussion and Conclusions

In the spectrum of schemes under the PES umbrella, state-run PES schemes generally entail the highest degree of government intervention, including designating or creating public institutions to administer PES.²⁶² In both the Costa Rican and Ecuadorian examples, a comprehensive legal framework has been developed to support governance of the PES scheme, setting out details such as which ecosystem services will be targeted, funding sources, participant eligibility and selection criteria, the level of payments, and the associated terms and conditions. The legal frameworks also establish clear roles and responsibilities for government actors and ensure transparency and accountability in management of the schemes. Also importantly, the linkages between PES and the broader institutional and legal framework for environmental governance and sustainable development are formalized in law, integrating PES firmly within this wider context and ensuring that PES contributes to desired policy objectives.

The discussion below elaborates on the role of legal frameworks in PES governance, comparing how the PPSA and Socio Bosque examples deal with some of the key themes related to ES-based approaches and PES that were identified in Chapter 2 and Chapter 3.

²⁵⁹ Consolidated Operations Manual supra (n 199), s. 2 para 9.2.

²⁶⁰ Consolidated Operations Manual supra (n 199), s. 10.

²⁶¹ *ibid.*

²⁶² BA Willaarts et al. 'Legal Framework and Economic Incentives for Managing Ecosystem Services' in BA Willaarts, A Garrido, and MR Llamas (eds.) *Water for Food and Wellbeing in Latin America and the Caribbean: Social and Environmental Implications for a Globalized Economy* (Routledge 2014) 365; T Greiber (ed), *Payments for Ecosystem Services: Legal and Institutional Frameworks* (IUCN 2009).

The role of government and institutions for PES. Both legal frameworks deal with the role of government in protecting ecosystem services. In both examples, constitutional rights to a healthy environment (and in the case of Ecuador, rights to ES explicitly), form the underlying normative frame for PES and are used to justify public funding of PES.²⁶³ In the case of Ecuador, the constitution establishes the fundamental role of the state in protecting ES on behalf of the public, along with a clear prohibition on the privatization of rights to ES. This is also an assertion of jurisdiction to regulate activities based on impacts on ES. In the case of Costa Rica, the *Forestry Law* does not address ecosystem services outside the context of the PPSA, but establishes the role of government in protecting forest ecosystem services and gives FONAFIFO discretion to administer the PPSA in the public interest. As discussed below, in both cases, the government is positioned as an intermediary that acts on behalf of the public in protecting benefits from ES.

Costa Rica's PPSA and its lead agency FONAFIFO are established by statute under the *Forestry Law*, legally entrenching the scheme to a greater degree than Socio Bosque, which is created by Ministerial accord and with a limited period of funding, making it dependent on ongoing political support for its continuation. Also, where the *Forestry Law* enables FONAFIFO to seek out a variety of funding sources, and other laws have been used to dedicate tax revenues to the PPSA, this has created greater diversity, resilience and permanence for programme funding. By contrast, Socio Bosque depends wholly on national budget allocations, which has proven to be challenging during the economic hardship in 2015, and leaves the programme's future uncertain beyond its initial funding term.

The legal frameworks for both the PPSA and Socio Bosque set out payment amounts and participant selection criteria, which supports transparency and fairness in implementing contracts and reduces the opportunity for corruption. The law in both cases also provides for accountability in administration of the schemes by establishing agencies with oversight from government departments, and structured reporting requirements for accountability. It has been observed that the transparency and straightforwardness of the Socio Bosque scheme has generated strong support from rural and indigenous communities.²⁶⁴ Both examples also include rules intended to support transparency and avoid conflict at the community level where collective contracts are

²⁶³ A Casas and R Martínez, *Marcos legales para el pago por servicios ambientales en América Latina y el Caribe: análisis de ocho países* [Legal frameworks for payments for ecosystem services in Latin America and the Caribbean: analysis of eight countries] (Organización de los Estados Americanos [Organization of American States] 2008).

²⁶⁴ de Koning et al. supra (n 157).

entered into, by requiring that applicants demonstrate the decision-making process followed community procedures.

Application of the ES concept. Both the PPSA and Socio Bosque schemes explicitly reflect the ecosystem services concept and terminology. In the case of Ecuador, the importance of protecting ES is recognized in the constitution, influencing the fundamental framework for environmental protection and sustainable development in the country. The legal frameworks in both cases codify broad, descriptive categories of ES that are the target of PES agreements (i.e. water, carbon, biodiversity, and aesthetic beauty in the case of the PPSA). The law does not require that more detailed ES categorization frameworks be considered (e.g. distinguishing provisioning, cultural, regulating and maintenance/supporting services or any subcategories within these). This simplified approach highlights the relevance of ecosystem services to existing policy arenas (e.g., climate change, water security, biodiversity conservation). It also avoids codifying a more complex conceptualization of ES in law, providing flexibility for the legal framework to be applied with evolving knowledge about ES relationships. There are also rules respecting the detailed contractual terms and conditions that are intended to link land use to ES provision, and these are set out in operations manuals that can be more easily updated.

For both the PPSA and Socio Bosque, there is a high degree of central government control through the law in determining how the ES concept is applied, including which ES are eligible for payments. There is also a process of prioritisation internal to government in order to determine budget allocations to different types of ES. In the case of Socio Bosque, a government agency is responsible for selecting applications, and in the case of Costa Rica, FONAFIFO's composition is set out in law and includes forestry and government representatives, without broader public representation. On the face of the law, there are not formal or guaranteed participatory processes for input on how funds for the programme are allocated. There is also very limited room for negotiation of individual contracts based on templates set out in law. While this enhances transparency and may enhance perceptions of fairness, and enables the central government to carry out an integrated planning function, a centralised approach combined with a lack of opportunities for public participation in decision-making may fail to represent some interests in ES. One potential area for future research is whether and how communities have been involved in the design of and decision-making related to the PPSA and Socio Bosque in practice, while this may not be set out in the law.

Rationale and theory for PES. Some critiques of PES models like the PPSA and Socio Bosque centre around the perceived economic inefficiencies of applying a government subsidy rather than a true market mechanism²⁶⁵ and not measuring ES directly,²⁶⁶ and rewarding conservation behaviour that may continue in the absence of payments.²⁶⁷ The legal frameworks prescribe payment amounts, and do not include guidance on how these amounts are determined - such as requiring consideration of total economic value of ES or opportunity cost. PES transactions under both schemes are only partially voluntary on the part of buyers, and do not directly involve ES beneficiaries. The government can be characterized as a third party that pays for ES on behalf of multiple beneficiaries. Both schemes can be better understood based on Pigouvian economic theory, whereby the state uses subsidies to encourage positive externalities.²⁶⁸ Both the PPSA and Socio Bosque are voluntary on the part of participants, who agree to restricted land uses without regulatory coercion. This is consistent with the idea underlying PES that positive outcomes can be achieved with incentives that nudge participants who are willing to undertake conservation actions, which can be more efficient and effective than enforcing regulations. Both Costa Rica and Ecuador also recognize in law the idea that those who voluntarily contribute to the provision of ecosystem services should be rewarded.

Furthermore, as discussed in Chapter 3, the criteria of ‘conditionality’ and ‘additionality’, where payments would be conditional on the provision of a clearly identified ecosystem service, are considered important to the effectiveness of PES. These criteria are not strictly adhered to in the design of either the PPSA or Socio Bosque, likely due to the cost of measuring ES relative to the costs of administering the scheme. Since payments under the PPSA and Socio Bosque are not linked to ecosystem services directly, and flows of ecosystem services themselves are not measured, true ‘additionality’ difficult to ascertain.²⁶⁹ However, this has not been considered a limitation to policy implementation.²⁷⁰ Research on ES in both countries informs the selection of the sites selected for enrollment, but there is no attempt to measure the ES provision gained from

²⁶⁵ R Fletcher, J Breitling ‘Market mechanism or subsidy in disguise? Governing payment for environmental services in Costa Rica’ (2012) 43 *Geoforum*, 402.

²⁶⁶ S Pagiola ‘Payments for environmental services in Costa Rica’ (2008) 65(4) *Ecological Economics* 712.

²⁶⁷ Karousakis *supra* (n 16); PM Mohebalian and FX Aguilar, ‘Additionality and design of forest conservation programmes: Insights from Ecuador’s Socio Bosque Programme’ (2016) 71 *Forest Policy and Economics* 103.

²⁶⁸ A Vatn ‘An institutional analysis of payments for environmental services’ (2010) 69 *Ecological Economics* 1245.

²⁶⁹ GA Sánchez-Azofeifa et al. ‘Costa Rica’s payment for environmental services programme: intention, implementation, and impact’ (2007) 21 *Conservation Biology* 1165.

²⁷⁰ Porras *supra* (n 1).

individual contracts. The legal frameworks in both cases assign responsibility to the lead government agency for monitoring compliance. Only Socio Bosque includes criteria related to ecosystem pressures/risk within the rules for site prioritization. This addresses the likelihood of ‘additionality’, as higher risk areas would more likely be degraded in the absence of the protection achieved via PES. The requirement under Socio Bosque that eligible land cannot have been cleared of vegetation within the past 20 years also provides a safeguard towards additionality – at least requiring that payments do not reward the purposeful degradation of ES to take advantage of the PES incentive.

It is widely acknowledged that legal reforms in the 1990s, including the PPSA, have contributed to the impressive decrease in Costa Rica’s national deforestation rate, but some commentators have suggested it is possible that much of this forest conservation would have happened regardless of payments.²⁷¹ One study suggested that most participants in the forest protection modality likely would have protected their forests even without payments, but that sustainable forest management and reforestation modalities had provided participants with the economic means and technical assistance to invest in long-term land use changes, resulting in measurable changes in the landscape.²⁷² Similarly, a survey of Socio Bosque participants’ attitudes towards conservation found that less than one percent of land enrolled in the programme would be deforested if not for the incentives.²⁷³ However, these studies are limited in the absence of a counterfactual scenario. One study compared households enrolled in Socio Bosque to similar households not enrolled, and found that Socio Bosque could be attributed to 70 percent of the reductions in deforestation.²⁷⁴ Some research also suggests that participation in the PPSA and Socio Bosque shifts attitudes in favour of conservation (‘crowding in’ motivations).²⁷⁵

While payments are not strictly conditional on the provision of ES, the rules developed under the PPSA and Socio Bosque do require that payments are conditional on specific restrictions on land use. The prescribed contractual terms include mechanisms to enforce conditionality, for

²⁷¹ Karousakis 2007; Ortiz et al. 2002

²⁷² Miranda, Porrás and Moreno supra (n 72).

²⁷³ Mohebalian and Aguilar supra (n 167).

²⁷⁴ KW Jones et al. ‘Forest conservation incentives and deforestation in the Ecuadorian Amazon’ (2017) 44(1) *Environmental Conservation* 56.

²⁷⁵ Cody supra (n 99); Legrand et al. ‘Concepción de justicia y gobernanza del programa de Pago por Servicios Ambientales costarricense: Hacia un mejor entendimiento de su tipo de arreglo institucional’ [Concepts of justice and governance in Costa Rica’s PPSA: Towards a better understanding of institutional arrangements] (2016) 26 *Revista Iberoamericana de Economía Ecológica* 207.

example, by requiring repayment of incentives in the case of breach of contract. Eligibility rules under the PPSA and Socio Bosque that require participants to be owners or have registered interests in land can also be related to the concept of conditionality: legal rights to land are needed in order for participants to be able to agree to contract terms respecting land use, and in order for those conditions to be enforceable. The PPSA creates some exceptions, balancing legal certainty with the social equity goals of the programme. In Ecuador, Socio Bosque has been implemented concurrently with support for prospective participants to secure land titles, which also integrates the programme with sustainable development aims.

Property rights and rights to ES. On the other end of the spectrum, the PPSA scheme has been criticized as being too neoliberal, favouring private, wealthy interests, with detrimental consequences for society and biodiversity.²⁷⁶ For example, as noted above, the requirement for licensed foresters to verify PPSA applications has favoured wealthier landowners. It has been argued that the creation of a private market for foresters has extended the influence of market forces into the realm of conservation.²⁷⁷ Some of these concerns have been addressed in recent reforms to the PPSA to encourage more participation from marginalized and Indigenous communities. It has also been observed that the water tariff reorients the PPSA under a neo-liberal logic by requiring that revenues be applied in the watershed where they are generated, giving wealthier watersheds which have larger water users a disproportionate share of benefits from the PPSA.²⁷⁸ It can also be argued that ecosystems in more heavily used watersheds bear the greatest impacts, which warrants the need for greater PPSA investment. Furthermore, the PPSA rules give FONAFIFO discretion to target any areas identified as important for water protection (such as those identified in basin plans). Overall, the neoliberal influence appears minimal.

Other commentators have raised concerns about how funding sources may skew ES protection under the PPSA, to the detriment of biodiversity, because beneficiaries are harder to identify, there is no clear “user” to tax, and there is less private motivation to invest in biodiversity compared to water and carbon storage.²⁷⁹ However, while contributions from identifiable beneficiaries have supplemented PPSA funding, public funding still makes up the majority share. Furthermore, FONAFIFO has discretion to distribute private funding sources in the public interest.

²⁷⁶ Matulis supra (n 98).

²⁷⁷ *ibid.*

²⁷⁸ *ibid.*

²⁷⁹ Pagiola supra (n 266).

Private interests have not dominated PPSA implementation, with the greatest portion of funding going to reforestation with species at risk and forest protection generally. Also, even where other ecosystem services are the main target, each of the modalities under the PPSA results in biodiversity protection. Socio Bosque goes further to ensure that one ecosystem service does not dominate, by requiring that each agreement under the programme be linked to at least two ES. This would ensure, for example, that while there may be international interest and funding to protect forest carbon, this would be applied in a way that also achieves local benefits related to water and biodiversity.

The broad scope of possible PPSA funding under the *Forestry Law* allows FONAFIFO to utilize multiple sources of funds, which do not align with only one ideological perspective or principle. The programme has leveraged private sources of funding based on the ‘beneficiary pays principle’ where they exist, but also designed taxes that are consistent with polluter pays principle, and heavily resourced the programme from public funds, recognizing the public interest in conservation. By contrast, in the absence of diverse funding sources, Socio Bosque appears less sustainable. The possibility under the PPSA for private funders to direct the use of their funds opens the door for private interests to influence ES protection. However, given the ultimate discretion of FONAFIFO regarding whether or not to enter into agreements, there are strong protections of the public interest even if private funding sources became more prominent. Similarly, by directing REDD+ funding through the PPSA and Socio Bosque, the legal frameworks for these schemes have been used to establish government control over how international funds are applied in the national interest.

Policy integration. It is perhaps more helpful to view the PPSA and Socio Bosque from the lens of broader conservation and sustainable development strategies. Many factors can be assumed to have influenced PES design by the governments of Costa Rican and Ecuador towards policy goals beyond achieving the most efficient provision of individual ecosystem services. In Costa Rica, the PPSA was implemented in the context of a broader shift to support conservation, and given a history of subsidies in the forest industry. In Ecuador, Socio Bosque was delivered based on a strong mandate of environmental protection, poverty reduction, social assistance and wealth redistribution. It has been observed in the case of the PPSA that its design indicates the government is more “concerned with pursuing a particular socio-ecological vision over unrestrained market-

rule”.²⁸⁰ Some commentators have gone further to argue that the fundamental rationale underlying this model of PES is not utilitarian logic, but a conception of justice that aims primarily to reward and strengthen the intrinsic motivations of the participants, and to reinforce existing governance structures that support conservation.²⁸¹

The legal frameworks for the PPSA and Socio Bosque both build poverty indicators into the participant selection and prioritization criteria, and give preference to small landholders and Indigenous participants. The dual policy goals of ecosystem protection and rural economic development are key to the design of the Socio Bosque and PPSA models, with the recent reforms to the PPSA representing a shift towards greater consideration of socioeconomic objectives. For both the PPSA and Socio Bosque, the rules respecting the selection of sites also explicitly include priorities set by other government agencies, specifically sites of importance for drinking water or other sites of importance to water identified in basin planning. In this way, the legal frameworks set up PES as a tool to integrate land-based conservation with water management.

²⁸⁰ Matulis *supra* (n 98), 256.

²⁸¹ Legrand *supra* (n 275).

CHAPTER 5
LAWS REGULATING PAYMENTS FOR ECOSYSTEM SERVICES:
CASE STUDIES FROM PERU AND COLOMBIA

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5.1 Introduction

This chapter considers two case studies of legal frameworks that regulate PES. Section 5.2 focuses on Peru’s national general law for PES and relevant regulations that set out a framework for water utility participation in PES for drinking water source protection. Section 5.3 considers the regulatory framework in place in Colombia for PES carried out by local and regional government agencies for drinking water source protection. The case studies consider laws that apply at the national level in the jurisdictions of Peru and Colombia, respectively, and do not consider specific examples of PES schemes in practice. Section 5.4 provides an analysis of the role of these legal frameworks in shaping PES, and how this relates to the broader issues surrounding ecosystem services and PES identified in Chapters 2 and 3.

5.2 Peru’s Payment for Ecosystem Services Law

5.2.1 Context and Overview of Legal Framework for PES

Environmental and economic development context. Peru covers about 1.29 million square kilometres in western South America,¹ supporting a population of over 31 million, with about 21

¹ 'Surface Area (sq. km)' (The World Bank: Data)

<https://data.worldbank.org/indicator/AG.SRF.TOTL.K2?year_high_desc=true > accessed 6 May 2018.

percent living in rural areas in 2016.² It has a High Human Development Index (ranked 87th in the world in 2015 according to the United Nations Development Programme),³ while GDP per capita was US \$6,049 in 2016, significantly below the OECD average of US \$36,881.⁴ It experienced rapid economic development between 2000 and 2012, which resulted in the advancement of several Millennium Development Goals.⁵ Rates of poverty dropped from 59 percent of the overall population in 2004 to 21 percent in 2016,⁶ while economic inequality remains significant.⁷ In 2015, while a high percent of the population had access to basic water services, only 20 percent of the rural population and 58 percent of the urban population had access to basic and safely managed drinking water services.⁸

Peru is rich in natural resources, while pressures on ecosystems are increasingly creating environmental risks and degrading ES.⁹ Its geography is divided in three regions: the Pacific coastal region, the Andes mountains, and the Amazon rainforest. Peru is considered one of the world's megadiverse countries, ranking in the top three in the world for bird, amphibian, and mammal diversity and with about 10 percent of the earth's species of flora.¹⁰ Protected areas cover about 17 percent of the country.¹¹ Peru's forests are of international significance, holding the second largest area of remaining tropical forest in the world, behind Brazil.¹² These forests support biodiversity, regulate water flows, maintain soil stability, are a globally significant carbon sink, and a source of

² 'Population, total' (The World Bank: Data)

<https://data.worldbank.org/indicator/SP.POP.TOTL?year_high_desc=false> accessed 6 May 2018.

³ 'Human Development Data (1990-2015)' (United Nations Development Programme, Human Development Reports) <<http://hdr.undp.org/en/data>> accessed 6 May 2018.

⁴ 'GDP per capita (current US\$)' (The World Bank: Data) <<http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>> accessed 6 May 2018.

⁵ 'Peru: Tercer Informe Nacional de Cumplimiento de los Objetivos de Desarrollo del Milenio [Peru: Third National Report on the Achievement of Millenium Development Goals]' (Presidencia del Consejo de Ministros [President of the Council of Ministers] 2013).

⁶ 'Poverty headcount ratio at national poverty lines (% of population)' (The World Bank: Data) <<https://data.worldbank.org/indicator/SI.POV.NAHC?locations=PE&view=chart>> accessed 6 May 2018.

⁷ Peru: Third National Report on the Achievement of Millenium Development Goals supra (n 5).

⁸ 'Peru' (JMP WASH Data) <<https://washdata.org/data#!/per>> accessed 14 April 2018.

⁹ Peru: Third National Report on the Achievement of Millenium Development Goals supra (n 5).

¹⁰ 'Peru: a Mega-Diverse Country Investing in National Protected Areas' (World Bank 2013) <<http://www.worldbank.org/en/news/feature/2013/06/06/peru-pais-megadiverso-que-invierte-en-areas-naturales-protegidas-gpan-pronap>> accessed 15 January 2018.

¹¹ 'Peru – Country Profile' (Convention on Biological Diversity Country Profiles) <<https://www.cbd.int/countries/profile/default.shtml?country=pe>> accessed 15 January 2018.

¹² 'Global Forest Resources Assessment 2010' (Food and Agriculture Organization 2010).

humid air that maintains regional rainfall patterns.¹³ Rates of forest loss are difficult to assess with certainty, with the government estimating about 103,380 hectares were lost in 2011¹⁴, while Global Forest Watch estimates 231,000 hectares was lost in 2016, based on updated technology using satellite imagery.¹⁵ Based on satellite data, tree cover remains across 49.6 percent of Peru's land area.¹⁶ Deforestation and forest degradation is the largest source of greenhouse gas emissions in the country. The government has set an ambitious (and perhaps unachievable) target of net-zero deforestation by 2021, supported by initiatives including REDD+ and other PES.¹⁷

Páramos are another critical source of multiple ecosystem services. These high mountain ecosystems, typical throughout the Andean mountain chain, are composed of high elevation lakes, peat bogs and wetlands that provide water storage and groundwater recharge, carbon fixation in soil and support high biodiversity. The location of páramos upstream in the watershed makes them especially important to water supply.¹⁸ Mining represents the greatest threat to páramos, and the conversion of land to mining results in the contamination of drinking water sources and, often, the loss of natural aquatic ecosystems when lakes are converted to tailings ponds.¹⁹ Water resources are unevenly distributed throughout Peru's regions. While water is abundant in the less populated Amazon basin, over 80 percent of the population lives in the arid coastal region or semi-arid zones, including the capital city of Lima.²⁰ Lima is considered the second-largest desert city in the world and its 9 million residents face severe water stress. There is high river flow in the rainy season (though contamination remains an issue), and there have been investments in built reservoirs, but these are insufficient to last the dry season.²¹ The loss of glaciers due to climate change is reducing water availability, while there is increasing demand from growing urban population centres.²² In

¹³ 'Plan Nacional de Accion Ambiental [National Environmental Action Plan]: 2011 – 2021' (Ministerio del Ambiente [Ministry of Environment] 2011).

¹⁴ 'El Perú de los Bosques [Forests of Peru]' (Ministerio del Ambiente [Ministry of Environment] 2011).

¹⁵ 'Peru' (Global Forest Watch) <<http://www.globalforestwatch.org/country/PER>> accessed 15 January 2018.

¹⁶ *ibid.*

¹⁷ National Environmental Action Plan *supra* (n 13).

¹⁸ W Buytaert and B De Bièvre 'Water for cities: The impact of climate change and demographic growth in the tropical Andes' (2012) 48(8) *Water Resources Research*.

¹⁹ National Environmental Action Plan *supra* (n 13).

²⁰ *ibid.*

²¹ G Gammie and B de Bievre, *Assessing Green Interventions for the Water Supply of Lima, Peru: Cost-Effectiveness, Potential Impact, and Priority Research Areas* (Forest Trends 2015).

²² National Environmental Action Plan *supra* (n 13).

the Amazon basin, deforestation and clearance of vegetative cover is causing the loss and erosion of soils, reduction of biodiversity, and silting of rivers.²³

Small-scale 'migratory' agriculture is a significant driver of deforestation: land is cleared by (generally poor) rural occupants with little training or capacity in farming techniques, leading to fertile but loose topsoil being quickly eroded and occupants moving on to clear additional patches.²⁴ At the same time, recent research indicates that industrial monoculture plantations such as oil palm and cacao, along with oil and gas extraction sites, are growing in their impact, and that unpermitted, unregulated 'artisanal' gold mining is prevalent and highly destructive in some remote parts of the country.²⁵ Rapid urban and agricultural expansion along with road and infrastructure development, occurring largely without planning or coordination, is another important factor.²⁶ The Peruvian government estimates that up to 15 percent of national timber production is from illegal harvesting.²⁷

Uncertain land tenure has impaired both development and conservation in Peru, and posed challenges to PES.²⁸ A feudal land ownership system dominated until the 1960s, and the national titling and registration programme introduced in the 1990s has been slow to transfer and formalize title to individuals and communities in rural areas. While the land titling system does recognize collective title for indigenous people and rural *campesinos*, the process of recognizing these rights has been particularly slow.²⁹ Given these challenges, national government policy is focusing efforts on continuing to secure land titles, economic diversification, improving land use planning and zoning, and a range of environmental governance tools that are equitable for rural and indigenous communities, including payments for ecosystem services.³⁰ As of 2016, over 1,200 Indigenous communities had gained recognized title to 20 percent of Peru's forested area. With the exception

²³ *ibid.*

²⁴ A Ravikumar et al. 'Is small-scale agriculture really the main driver of deforestation in the Peruvian Amazon? Moving beyond the prevailing narrative' (2016) 10(2) *Conservation Letters* 170.

²⁵ *ibid.*

²⁶ *ibid.*

²⁷ National Environmental Action Plan *supra* (n 13).

²⁸ T Griebner, *Peru at the Climate Crossroads: How the Saweto and Indigenous Communities can Guide Peru Down the Right Path* (IUCN 2016).

²⁹ *ibid.*

³⁰ National Environmental Action Plan *supra* (n 13).

of one percent owned privately, the remainder is owned by the government (with concessions to forestry or ecotourism industries covering 14 percent).³¹

Legal and institutional context. Peru's legal system is based on the civil law tradition. Its constitution was enacted in 1993, the fifth since the start of the 20th century.³² It establishes Peru as a democratic, social state, organized as a presidential republic.³³ Power is divided between the legislative and executive branches and the judiciary. A congress of elected representatives holds legislative powers,³⁴ and powers to legislate on specific matters may also be delegated to the executive branch,³⁵ which includes the president, two vice presidents, and cabinet ministers charged with administration of the public service.³⁶ Ministers are appointed by the president and are not required to be members of congress.³⁷

The constitution envisions a form of government that is unitary, representative and decentralised.³⁸ It provides for a regional level of elected government, with a role in regulating regional issues, including in relation to environmental protection and natural resource management, subject to national law.³⁹ The constitution also establishes elected local governments,⁴⁰ charged with planning and zoning, local environmental issues, and the provision of water and sanitation services, in accordance with the national law.⁴¹ Decentralisation has been slow to develop in practice, and government functions remain largely centralised.⁴² There are currently 26 regional governments, 196 provincial governments and 1831 municipal governments. A major challenge to governance in Peru in general, and in particular environmental governance, has been coordination of whole-of-government policies.⁴³

³¹ I Monterroso et al. 'Reclaiming collective rights: Land and forest tenure reforms in Peru (1960–2016)' (CIFOR Working Paper 224, 2017).

³² Political Constitution of Peru, enacted 1993 and amended 2009 (English translation by J Gotelli et al., Bureau of the Congress of the Republic of Peru 2009).

³³ *ibid*, Art. 43.

³⁴ *ibid*, Art. 102.

³⁵ *ibid*, Art. 104.

³⁶ *ibid*, Art. 119.

³⁷ *ibid*, Art. 130.

³⁸ *ibid*, Art. 43.

³⁹ *ibid*, Art. 191.

⁴⁰ *ibid*, Art. 194.

⁴¹ *ibid*, Art. 195.

⁴² *Regulatory Policy in Peru: Assembling the Framework of Regulatory Quality* (OECD 2016)

<<http://dx.doi.org/10.1787/9789264260054-en>> accessed 5 June 2017.

⁴³ *ibid*.

Peru's constitution also contains several provisions relating to the natural environment. It establishes that every person has the right to an appropriate and adequate environment for the development of his/her life.⁴⁴ It also establishes that renewable and non-renewable natural resources are national patrimony,⁴⁵ that the state has explicit duties to conserve biodiversity and to create natural protected areas.⁴⁶ Legislation and institutions for environmental governance have undergone significant advancements in the past ten years. The Organic Law for Sustainable Management of Natural Resources [*Ley Orgánica para el Aprovechamiento Sostenible de los Recursos Naturales*] establishes rules for how the state will manage and grant rights over use of resources, including ground water and surface water, soil, and forests. The law refers explicitly to ecosystem services, and mandates the national government to develop inventories, including valuations where possible, of natural resources and the ecosystem services these may provide.⁴⁷ The General Environmental Law [*Ley General del Ambiente*] also explicitly recognizes that natural resources and other components of the environment generate ecosystem services. It mandates the national government to develop mechanisms to value, reward and maintain the provision of the ecosystem services, achieved through the conservation of natural resources, ecosystems, and biological diversity.⁴⁸ The Ministry of Environment (Ministerio del Ambiente - MINAM) was created in 2008, and is now designated to carry out these legislative duties, along with environmental planning and policy-making.⁴⁹

The National Protected Areas Service (Servicio Nacional de Areas Naturales Protegidas) was also created in 2008,⁵⁰ and oversees a network of national protected areas, which includes a system for recognizing private protected areas.⁵¹ The Natural Protected Areas Law [*Ley de Areas Naturales Protegidas*] explicitly refers to protection of ecosystem services as an objective of creating protected areas. With respect to water resources in particular, it establishes the objective for protected areas to maintain and manage the functional conditions of watersheds, in order to

⁴⁴ Constitution of Peru supra (n 32), Art. 2.

⁴⁵ Constitution of Peru supra (n 32), Art. 66.

⁴⁶ Constitution of Peru supra (n 32), Art. 68.

⁴⁷ Law 26821 of 1997, Art. 10.

⁴⁸ Law 28611 of 2005, Art. 94, (direct translation by author).

⁴⁹ Decreto Legislativo [Legislative Decree] No. 2013 (Mayo [May] 2008).

⁵⁰ Decreto Legislativo [Legislative Decree] No. 1013 (Mayo [May] 2008).

⁵¹ '¿Quiénes somos?' [About us] (SERNAP) <<http://www.sernap.gob.pe/quienes-somos>> accessed 5 June 2017.

ensure water capture and flow, protect water quality, control erosion and sedimentation.⁵² The Forest and Wildlife Act [*Ley Forestal y de Fauna Silvestre*], enacted in 2012, also explicitly recognises the multiple uses and benefits provided by forests, including ecosystem services.⁵³

A new Water Resources Law [*Ley de Recursos Hídricos*] was introduced in 2009, creating significant changes for water governance based on the goal of integrated water resources management.⁵⁴ It establishes principles to guide water management, including recognition of the sociocultural, environmental and economic value of water, the priority of water allocation to meet basic human needs, and an ecosystem approach to water management based on the water cycle.⁵⁵ It created a new National Water Authority (Autoridad Nacional del Agua) to provide a central role in watershed planning and the granting of water rights⁵⁶ supported by regional administrative water authorities.⁵⁷ The National Superintendence of Sanitary Services (SUNASS) was created in 2001 and is responsible for the regulation of potable water and sanitation services and oversees municipal-level water service providers.⁵⁸

Overview of the legal framework for payments for ecosystem services. Peru's Law for Compensation Mechanisms for Ecosystem Services [*Ley de Mecanismos de Retribución por Servicios Ecosistémicos*, MRSE Law]⁵⁹ was introduced in 2014, creating a regulatory framework for all PES in the country. The law was passed by the National Congress following extensive debate, almost six years after a bill was first introduced.⁶⁰ It sets out as its purpose: to promote, regulate and supervise payment for ecosystem service schemes, where ecosystem services are secured in voluntary contracts for the conservation, restoration, and sustainable use of ecosystems.⁶¹ It establishes national government oversight for PES, whether involving public or private actors.

The MRSE Law codifies the ecosystem services concept, setting out key terms and carefully delineating the relationship between ecosystem functions that provide ecosystem services, and the

⁵² Law No. 26834, Art. 2 (direct translation by author).

⁵³ Law No. 29763, Art. 2.

⁵⁴ Law No. 29338.

⁵⁵ *ibid*, Art. 3.

⁵⁶ *ibid*, Art. 22.

⁵⁷ *ibid*, Art. 23.

⁵⁸ Decreto Supremo [Supreme Decree] No. 017-2001-PCM.

⁵⁹ Law 30215 of 2014.

⁶⁰ 'Peruvian Congress Passes Historic Ecosystem Services Law' (Forest Trends) <https://www.forest-trends.org/ecosystem_marketplace/peruvian-congress-passes-historic-ecosystem-services-law/> accessed 15 November 2016.

⁶¹ Law 30215 of 2014, Art. 4 (direct translation by author).

human activities which impact ecosystem functions, resulting in changes to the provision of ecosystem services.⁶² The scope of PES regulated under the law is defined broadly, including all schemes, tools, instruments and incentives applied to generate, channel, transfer and invest economic resources, monetary or non-monetary, for the conservation, restoration and sustainable use of the sources of ecosystem services.⁶³ This would encompass, for example, REDD+ projects, biodiversity offsets, and incentive schemes for watershed protection. To further guide implementation of PES, a regulation pursuant to the MRSE Law (MRSE Regulation) was passed by executive decree of the Ministry of Environment (Ministerio del Ambiente, MINAM) in July 2016.⁶⁴ The MRSE Regulation elaborates more detailed rules on PES and sets out specific requirements for PES agreements in relation to two types of ecosystem services: hydrological services and carbon sequestration and storage. With respect to the latter, it sets out how PES agreements may be nested within national participation in REDD+ initiatives.⁶⁵

Additional legislative support for the development of PES for hydrological services is found in a 2013 law [Water and Sanitation Law] introducing broad reforms to the regulatory regime for water and sanitation services in Peru.⁶⁶ This includes key provisions giving water utilities a mandate for PES.⁶⁷ Regulations developed pursuant to this law [Water and Sanitation Regulations] provide further guidance on the role of water service providers in PES.⁶⁸

5.2.2 PES Actors, Administration and Oversight

Administration and oversight. The MRSE Law declares national jurisdiction respecting PES. Based on constitutional provisions establishing national patrimony over natural resources, it declares that ecosystem services themselves are part of the national patrimony.⁶⁹ It further states that the promotion of public and private investments in ecosystem services is a matter of national interest, within the powers of the national government to oversee,⁷⁰ towards the objective of

⁶² Law 30215 of 2014, Art. 3.

⁶³ Law 30215 of 2014, Art. 3 (direct translation by author).

⁶⁴ Decreto Supremo [Supreme Decree] No. 009-2016, Reglamento de la Ley 30215 [Regulation of the Law 30215].

⁶⁵ Ibid, Arts. 29 - 31.

⁶⁶ *Ley de Modernización de los Servicios de Saneamiento [Law Modernizing Sanitation Services]*, Law 30045 of 2013.

⁶⁷ *ibid*, Arts. 3(b), 15.4.

⁶⁸ Decreto Supremo [Supreme Decree] No. 013-2016, Reglamento de la Ley 30045, [Regulation of the Law 30045].

⁶⁹ Law 30215 of 2014, Art. 3(b).

⁷⁰ Law 30215 of 2014, Supplementary Provisions, Clause 1.

ecosystem conservation, restoration, and sustainable use.⁷¹ Specifically, it gives MINAM a mandate to:⁷²

- supervise and oversee the management of ecosystem services;
- develop policies and protocols for PES development, in coordination with other authorities;
- develop PES for natural protected areas, in coordination with National Protected Areas Service;
- provide technical assistance on PES design, and invest in research on ecosystem functions that incorporates scientific and traditional knowledge;
- build capacity among local and regional governments to develop complementary policies for PES development;
- promote financing strategies to contribute to PES;
- administer, regulate, and supervise a national PES registry.

Towards fulfilling these objectives, MINAM must establish a PES Registrar, which is responsible under the MRSE Regulation for maintaining a publically available registry of all PES agreements in the country.⁷³ At the time of writing, activities towards fulfilling the above functions are underway, and a Pre-Registry is available online, towards a phased approach to full implementation. During the initial phase, the registration of projects is voluntary. Eighteen water-related and eight forest carbon-related PES schemes were included in the Registry as of May 2018, which are listed in a searchable database and as well as map format.⁷⁴

By way of the registration process (once it is fully implemented), the MINAM Registrar must also review and validate PES agreements.⁷⁵ The MRSE Regulation sets out a detailed procedure for submitting applications to register a PES agreement, and prescribes the following information that must be include in applications:⁷⁶

- A copy of the agreement signed by all parties;
- A geo-referenced map that identifies the location of the source of the ecosystem services subject to the agreement; and

⁷¹ Law 30215 of 2014, Art. 11.

⁷² Law 30215 of 2014, Art. 12.

⁷³ Regulation of the Law 30125, Art. 9.

⁷⁴ 'Pre-Registro de MRSE [MRSE Pre-Registry] (MINAM) <<http://servicioecosistemas.minam.gob.pe/>>, accessed 9 May 2018.

⁷⁵ Law 30215 of 2014, Art. 10.

⁷⁶ Regulation of the Law 30125, Arts. 17, 18.

- A document describing the baseline status of the ecosystem and how its structure and function relates to ecosystem services.

If the agreement involves a rural community or Indigenous group that is participating collectively as a party to the agreement, the application must also include meeting minutes from a community meeting where the PES agreement was approved in accordance with that community's decision-making procedures.⁷⁷ Furthermore, the law states that any PES project having a direct impact on the collective rights of indigenous people must comply with duties of prior consultation in accordance with established laws and conventions.⁷⁸ The Regulations set a deadline of 15 days for the MINAM Registrar to evaluate PES agreements and either validate them by entry in the registry or respond to the PES participants with questions or required modifications.⁷⁹ Once a PES agreement is registered, participants may access benefits through MINAM, such as technical assistance, participation in a network to share best practices and other information to improve implementation of PES. MINAM may also coordinate nesting of separate PES agreements with shared objectives or regional connectivity as part of a larger scheme, and facilitate negotiations with potential funders.⁸⁰ Based on the information in the registry, MINAM must produce an annual report each year demonstrating how PES is contributing to the national strategy for ecosystem management.⁸¹

The MRSE Law also authorizes local and regional governments to participate in and promote PES within the scope of their jurisdictional powers.⁸² PES participants may collaborate with local and regional governments, NGOs, individuals or corporations to form 'platforms of good governance' for PES to develop best practices, and may request participation and funding from MINAM.⁸³ The Water and Sanitation Regulation require SUNASS to work with water utilities to include PES in their operational plans, including providing technical support.⁸⁴

⁷⁷ Regulation of the Law 30125, Art. 18.2.

⁷⁸ Law 30215 of 2014, Supplementary Provisions, Clause 7.

⁷⁹ Regulation of the Law 30125, Art. 18.

⁸⁰ Regulation of the Law 30125, Art. 23.

⁸¹ Regulation of the Law 30125, Art. 24.

⁸² Law 30215 of 2014, Art. 13.

⁸³ Regulation of the Law 30125, Art. 11.

⁸⁴ Regulation of the Law 30045, Art. 72.1

In its role to coordinate and support the development of PES, MINAM has made water resources the first priority.⁸⁵ In 2012, prior to the enactment of the MRSE Law, MINAM launched the Watershed Services Incubator together with Forest Trends and with support of the Swiss Agency for Development and Cooperation. This continuing initiative has supported a series of pilot projects (with four in the implementation stage and a total of 17 sites planned as of 2014) to conserve highland ecosystems for the benefit of lowland water use.⁸⁶ Two Peruvian NGOs, CONDESAN and EcoDecisión, are key partners that have provided technical support and expertise.⁸⁷ Furthermore, in March 2015 MINAM signed an agreement with SUNASS to jointly develop policies and guidelines for PES to protect drinking water sources.⁸⁸

Beneficiaries, buyers and funding. The MRSE Law does not establish a dedicated funding source or identify specific buyers or beneficiaries of ecosystem services that must contribute to PES. Instead, it contains guidance and enabling provisions with respect to potential funding sources. The law broadly states that any beneficiaries of ecosystem services may potentially contribute to payments for ecosystem services. It defines “beneficiary” as any public or private, natural or legal person who obtains a benefit and provides compensation to those who contribute to the provision of ecosystem services.⁸⁹ It also explicitly authorizes all public entities to raise financial resources to dedicate to PES. Local and regional governments are authorized to support PES as part of their budgets, in accordance with any rules applicable to public expenditures. Local and regional governments may also receive and channel donations to PES,⁹⁰ which would allow them to act as intermediaries between local communities and international buyers (for example, through REDD+) or private companies.

The MRSE Regulation specifies that funds may be used not only for direct payments for ecosystem services, but also towards the costs of designing and monitoring PES schemes. Any funds dedicated to PES must be administered and accounted for separately.⁹¹ The MRSE Regulation

⁸⁵ Ministry of Environment (MINAM) press release

⁸⁶ G Bennett and N Carroll (eds), *Gaining Depth: State of Watershed Investment 2014* (Forest Trends 2014).

⁸⁷ ‘Forest Trends – Peru’ <<http://www.forest-trends.org/program.php?id=309#peru>> accessed 5 June 2017.

⁸⁸ ‘MINAM firma convenio con SUNASS para la implementación de Mecanismos de Retribución por Servicios Ecosistémicos Hidrológicos [MINAM signs agreement to implement PES for water]’ (MINAM Press Release 11 March, 2015) <<http://www.minam.gob.pe/notas-de-prensa/minam-firma-convenio-con-sunass-para-la-implementacion-de-mecanismos-de-retribucion-por-servicios-ecosistemicos-hidrologicos/>> accessed 5 June 2017.

⁸⁹ Law 30215 of 2014, Art. 3(e).

⁹⁰ Law 30215 of 2014, Art. 13; Regulation of the Law 30125, Art. 12.

⁹¹ Regulation of the Law 30125, Art. 27.3.

further provides that water utilities may be buyers of ecosystem services within the watersheds that provide their drinking water sources.⁹² Each water utility sets its own water tariffs, under the guidance of SUNASS. The Water and Sanitation Law requires that some portion of tariffs to be dedicated to watershed restoration, which may include funding of PES, without specifying a specific portion of tariffs.⁹³ SUNASS provides guidance in this regard and ultimately approves water tariffs and financing of PES.⁹⁴ The Water and Sanitation Regulation also clarifies that water service providers can combine funds with local and regional governments towards PES.⁹⁵

Lima's water service provider, as a leading example, has dedicated 1 percent of tariffs to watershed restoration⁹⁶ (without specifying what portion goes to PES), which is projected to amount to US \$30 million by 2020.⁹⁷ Lima has also committed US \$110 million derived from past water tariffs to a 'green infrastructure' plan to address water scarcity and quality.⁹⁸ This includes remarkable plans to restore remnant *Amunas*, a type of semi-natural infrastructure used by Incas. These ancient small-scale diversion channels historically conveyed stream flows into infiltration ditches dug into the mountainside in select areas of the upper watershed. Water would filter through shallow groundwater and emerge in pools and springs downslope over several weeks or months of lag time, so that it would arrive when needed in the dry season. There are also plans to restore grasslands and wetlands to store water, including through PES agreements.⁹⁹

Eligibility for payments. The MRSE Law contains detailed rules on who is eligible to receive ecosystem service payments. The Law defines 'ecosystem service contributors' as: i) natural, legal, private or public persons, who ii) contribute to the conservation, restoration and sustainable use of sources of ecosystem services, iii) by means of 'technically viable actions'. The third requirement,

⁹² Regulation of the Law 30125, Art. 21.1.

⁹³ Law 30045 of 2013, Art. 15.4.

⁹⁴ Regulation of the Law 30045, Art. 74.2.

⁹⁵ Regulation of the Law 30045, Art. 74.1.

⁹⁶ 'Plan Maestro Optimizado 2015-2044, Tomo IV [Optimised Master Plan, Part IV]'

<<http://www.sedapal.com.pe/plan-maestro-2015-2044>> accessed 5 June 2017.

⁹⁷ K Barrett 'Lima Kicks Off Development Of 30-Year Green Infrastructure Plan' (Forest Trends, 3 March 2017)

<https://www.forest-trends.org/ecosystem_marketplace/lima-kicks-off-development-30-year-green-infrastructure-plan/> accessed 21 May 2018.

⁹⁸ This approach was supported by a study carried out by Forest Trends supra (n 21).

⁹⁹ S Zwick 'Lima to Invest \$110 Million in Green Infrastructure And Climate Adaptation' (Forest Trends, 30 April 2015) <https://www.forest-trends.org/ecosystem_marketplace/lima-to-invest-110-million-in-green-infrastructure-and-climate-adaptation/> accessed 15 January 2018; 'Peru Lidera Iniciativa de Recursos Hidricos en Latinoamerica [Peru Leads Latin America in Water Resource Initiatives]'

<<http://www.sunass.gob.pe/doc/BoletinAderasa/2015/mayo/notacentral2.html>> accessed 15 January 2018.

while not further elaborated, alludes to some basis in science to demonstrate conditionality, connecting the payments to the actual provision of ecosystem services. The Law states that those within the definition of ecosystem service contributors may be remunerated by those that benefit from ecosystem services.¹⁰⁰

The Law further enumerates categories of ecosystem service contributors as: titleholders or possessors of lands; permit holders for renewable natural resources; NGOs under management agreements for protected areas; and others recognized by MINAM.¹⁰¹ The MRSE Regulation recognizes other potential ecosystem service contributors, including:¹⁰²

- The National Protected Areas Service, for protected natural areas under national administration;
- Managers of protected natural areas, as authorized by the National Protected Areas Service;
- Peasant and native communities, which, if not possessors or titleholders of land, may be eligible for payments if they are in the process of securing community title to land;
- Regional governments, for regional conservation areas and forests under their administration;
- Local governments, for forests under their administration;
- Any public entities, for ecosystems located on premises that they own.

The Law does not provide guidance on how and on what basis possessory rights would need to be established for the purposes of PES. Presumably, the eligibility of possessors of land as recipients of payments would be verified, and effectively secured, by MINAM as part of the verification of a PES agreements when it is submitted to the Registrar.

5.2.3 PES Design

Targeting ecosystem services. ‘Ecosystem services’ are defined under the MRSE Law as: the direct or indirect economic, social and environmental benefits people obtain from the correct functioning of ecosystems.¹⁰³ ‘Ecosystem’ is defined as a natural system of living organisms interacting with their physical environment as an ecosystem unit.¹⁰⁴ The ecosystem itself is recognized as the source of ecosystem services, while the restoration or maintenance of an

¹⁰⁰ Law 30215 of 2014, Art 2.

¹⁰¹ Law 30215 of 2014, Art. 3(d) (direct translation by author).

¹⁰² Regulation of the Law 30125, Art. 7.1

¹⁰³ Law 30215 of 2014, Art. 3(b) (direct translation by author).

¹⁰⁴ *ibid* (direct translation by author).

ecosystem through human intervention is recognized as contributing to the generation of ecosystem services.¹⁰⁵

The MRSE Law codifies the requirement of conditionality in PES, stating explicitly that payments must be conditional on performance of actions for the conservation, restoration and sustainable use of ecosystem that are sources of ecosystem services.¹⁰⁶ It also states a long-term objective for PES to ensure the permanency of the benefits generated by ecosystems.¹⁰⁷ The MRSE Regulation clarifies that ecosystem services may be generated by natural ecosystems or by ecosystems that are restored, modified or established by human intervention.¹⁰⁸ ‘Ecosystems restored by human intervention’ are defined as degraded, damaged or destroyed ecosystems, where human actions initiate or accelerate the restoration of ecosystem integrity and functionality. ‘Ecosystems established by human intervention’ are defined as ecosystems that are created by humans based on ecological conditions.¹⁰⁹

A list of specific ecosystem services that may be the subject of PES contracts is enumerated in the MRSE Regulation, including: water regulation; maintenance of biodiversity; carbon sequestration and storage; landscape beauty; control of soil erosion; provision of genetic resources; regulation of air quality; climate regulation; pollination; regulation of natural hazards; recreation and ecotourism; nutrient cycling; and formation of soils.¹¹⁰ The MRSE Regulation elaborates that in exchange for payments, ecosystem service contributors must generate, maintain or improve ecosystem services through the performance of one or more of the following actions¹¹¹: conservation of natural spaces; restoration of areas of degraded ecosystems; or, sustainable use of ecosystems that are sources of ecosystem services, including traditional practices and ways of life.

The MRSE Regulation sets out more specific guidance on payments for hydrological services, which may provide compensation for: i) the implementation of actions that generate, maintain, increase or improve ii) the quality, quantity or timing of water resources iii) that are required for human settlements, irrigation, power generation, or other uses.¹¹² The first criterion allows for

¹⁰⁵ *ibid* (direct translation by author).

¹⁰⁶ Law 30215 of 2014, Art. 5.

¹⁰⁷ Law 30215 of 2014, Art. 4.

¹⁰⁸ Law 30215 of 2014, Art. 6.2.

¹⁰⁹ Regulation of the Law 30125, Art. 3 (direct translation by author).

¹¹⁰ Regulation of the Law 30125, Art. 6.1.

¹¹¹ Regulation of the Law 30125, Art. 8.

¹¹² Regulation of the Law 30125, Art. 26.

either passive or active participation in generating ecosystem services, while the second criterion points to the types of ecosystem functions that may be implicated, and the third criterion requires directness in the link between ecosystem functions and the benefit to humans. Neither the Law nor the Regulation provides guidance on the selection of specific properties or prioritization of potential payment recipients. This is appropriate given the broad scope of potential PES schemes that could be captured by the law. Spatial targeting could be undertaken outside the law depending on the aims of a particular PES scheme.

Structure of incentive and payment terms and conditions. The terms and conditions of a PES arrangement must be set out in a written agreement, including identification of the ecosystem service that is the subject of the agreement, the ecosystem service contributor(s) that will receive payments, and the ecosystem service beneficiary who will provide payments.¹¹³ The agreement, submitted to the MINAM Registrar, must also describe the following:¹¹⁴

- The specific actions to be undertaken by ecosystem services contributors;
- The location and description of the area where those actions will be implemented;
- The expected ecosystem services, in terms of social, environmental and economic benefits;
- The amount of the remuneration and arrangements for payments;
- The funding source and financing strategy for payments;
- Specific actions for monitoring compliance with the agreement.

The MRSE Law does not set out guidance on appropriate monitoring actions or require that monitoring demonstrate actual changes in an ecosystem or the flow of ecosystem services, but merely requires that the issue of monitoring be addressed in an agreement.

Any actions taken agreed upon in a PES arrangement must be consistent with any environmental laws or management and planning instruments applicable to the area.¹¹⁵ Furthermore, the MRSE Regulation confirms that any actions taken in the fulfillment of obligations under PES arrangements to not relieve the parties from compliance with legislation or the civil law, or exempt them from any criminal or administrative sanctions.¹¹⁶ Despite the objective of the

¹¹³ Regulation of the Law 30125, Art. 6.3.

¹¹⁴ Regulation of the Law 30125, Art. 10.

¹¹⁵ Regulation of the Law 30125, Art. 8.3.

¹¹⁶ Regulation of the Law 30125, Art. 7.3.

MRSE Law to permanently secure ecosystem services, there is no minimum term for PES agreements.

The MRSE Regulation sets out guidance for how the value of the PES incentive may be determined, but leaves the amount and terms of payment largely up to the parties to the agreement. The amount of the remuneration for contributors to ecosystem services may take into account the following: The economic value of the ecosystem services, estimated with reference to MINAM's National Guide on Economic Valuation of Natural Capital; costs incurred in the actions carried out by ecosystem services contributors; any other factors that the parties consider appropriate.¹¹⁷ The Regulation also allows flexibility in the structure of remuneration, which may include the following:

- Direct funding for specific activities that contribute to ecosystem services;
- Payments conditional on actions that contribute to ecosystem services, without a direct link to funding of the specific activities that are required;
- Financing for infrastructure or other investment in sustainable economic development that will benefit the ecosystem service contributors, conditional on actions that contribute to ecosystem services;
- Any other arrangements agreed on with the free consent of all parties.

For private entities, payments may be managed via a financial institution as intermediary.

The MRSE Regulation further states that funding arrangements should take into account considerations of culture, gender, equity, and geographical, ecological and socio-political diversity.¹¹⁸ It follows that the MINAM Registrar should also consider these factors in the process of reviewing and validating PES agreements. The Regulation also specifies that any public resources spent on PES must be managed in accordance with existing rules on budget expenditures.¹¹⁹

Monitoring and enforcement. MINAM is responsible for monitoring implementation of registered PES agreements, and has powers to carry out unscheduled field visits and to request any necessary supporting documentation from PES participants at any time. MINAM may also issue recommendations at any time to improve PES implementation.¹²⁰ The Registrar may revoke registration of a PES agreement if false information was provided in the application to register the

¹¹⁷ Regulation of the Law 30125, Art. 9.

¹¹⁸ Regulation of the Law 30125, Art. 9.3

¹¹⁹ Regulation of the Law 30125, Art. 9.4.

¹²⁰ Regulation of the Law 30125, Art. 25.

agreement, or if the terms for conservation, recovery or sustainable use of ecosystems set out in the agreement are breached. Any party to the agreement may provide information to MINAM to show that the terms of the agreement have been breached, which must be verified by MINAM.¹²¹ The MRSE Regulation is silent on the contractual rights of parties, who, in accordance with general contract law and the specific terms of the agreement, would be able to enforce the agreement and/or sue for damages in the civil courts.

The MRSE Regulation requires that the MINAM Registrar must also be notified if accident or force majeure prevents an ecosystem service contributor from the implementation of actions to fulfill the PES agreement. In such cases, MINAM has discretion to intervene to provide technical assistance. If the situation is not remedied within 60 days of the incident, MINAM may revoke the agreement or require any modifications it considers appropriate.¹²²

5.3 Colombia's Regulation of Payments for Ecosystem Services to Protect Drinking Water Sources

5.3.1 Context and Overview of Legal Framework for PES

Environmental and economic development context. The Republic of Colombia covers an area of 1.14 million square kilometres at the northern tip of South America,¹²³ with a population of over 48 million in 2016, making it the third-most population dense country in Latin America, after Mexico and Brazil.¹²⁴ Colombia has a High Human Development Index (ranked 95th in the world in 2015 by the United Nations Development Programme).¹²⁵ GDP per capita was US \$5,805, in 2016, significantly below the OECD average of US \$36,881.¹²⁶ Rates of poverty decreased significantly from 50 percent of the population in 2002 to 28 percent in 2015, while significant wealth disparities remain.¹²⁷ In 2015, while a high proportion of the population had access to basic water services,

¹²¹ Regulation of the Law 30125, Art. 22.

¹²² Regulation of the Law 30125, Art. 20.

¹²³ 'Surface Area; (sq. km)' (The World Bank: Data)

<https://data.worldbank.org/indicator/AG.SRF.TOTL.K2?year_high_desc=true> accessed 6 May 2018.

¹²⁴ 'Population, total' (The World Bank: Data)

<https://data.worldbank.org/indicator/SP.POP.TOTL?year_high_desc=false> accessed 6 May 2018.

¹²⁵ 'Human Development Data (1990-2015)' (United Nations Development Programme, Human Development Reports) <<http://hdr.undp.org/en/data>> accessed 6 May 2018.

¹²⁶ 'GDP per capita' supra (n 4).

¹²⁷ 'Poverty headcount ratio' supra (n 6).

only 40 percent of the rural population and 81 percent of the urban population had access to basic and safely managed drinking water services.¹²⁸

Colombia has five distinct ecological regions: the Pacific and Caribbean coastal regions, the Andean mountainous region, the Amazon rainforest and the Orinoco grasslands. It is home to high levels of biodiversity, ranking first in the world for bird and orchid species, and second for plants, butterflies, freshwater fish and amphibians, representing close to 14 percent of the planet's total biodiversity. Among the most important ecosystems are Andes páramos, rainforest, dry forest and wetlands.¹²⁹ Pressures on ecosystem services are most evident in the Andean region, which is the greatest source of biodiversity and endemic species, while also being the most population dense and the most water stressed. A network of 59 protected areas covers 11 percent of its total land and 1.5 percent of it is marine area. Twenty-six of these areas are inhabited by indigenous and other traditional communities.¹³⁰

Colombia retains high forest cover, with satellite images indicating that 58.2 percent of the country remains forested.¹³¹ Reported annual deforestation rates differ, but based on satellite imagery Global Forest Watch estimates 291,000 hectares were lost in 2016.¹³² Factors leading to deforestation identified by the Colombian government include infrastructure (including that associated with energy-related activities, and roads, etc.), mining, removal of timber for sale or personal consumption (including both legal and illegal extraction); wildfires; and, production of illicit crops, particularly coca (used to make cocaine).¹³³ In the 1990s, a government programme of aerial spraying of herbicides aimed at eradication of illicit coca cultivation also contributed to loss of forests. One study estimated that for every hectare of forest sprayed, another is lost due to herbicide drift and another due to additional clearing to replace the destroyed coca. Deforested patches clear the way for conversion of even greater areas for cattle ranching, which is often seen as the only viable alternative for peasants moving away from growing coca.¹³⁴

¹²⁸ 'Colombia' (JMP WASH Data) <<https://washdata.org/data#!/col>> accessed 14 April 2018.

¹²⁹ 'Colombia – Country Profile' (Convention on Biological Diversity Country Profiles)

<<https://www.cbd.int/countries/?country=co>> accessed 5 June 2017.

¹³⁰ *ibid.*

¹³¹ 'Colombia' (Global Forest Watch) <<http://www.globalforestwatch.org/country/COL>> accessed 15 January 2018.

¹³² *ibid.*

¹³³ 'La Propuesta de Preparación para REDD+ Versión 8.0 [Proposal for REDD+ Readiness Version 8.0]' (Ministerio del Ambiente y Desarrollo Sostenible [Ministry of Environment and Sustainable Development] 2013).

¹³⁴ R Vargas 'The Anti-Drug Policy, Aerial Spraying of Illicit Crops and Their Social, Environmental and Political Impacts in Colombia' 2002 32 (1) *Journal of Drug Issues* 11.

While Colombia has an abundant supply of water compared to its land area, there is high regional variation and significant anthropocentric pressures on water resources near urban centres. Rainfall is concentrated in the Amazon region, while the Andean zone, which the bulk of the population resides, has only 15 percent of the total water supply. Loss of glaciers due to climate change is a particular concern, with government data showing losses of 5 percent coverage per year and risks of total depletion within three decades, making water storage capacity critical. Colombia has abundant natural storage capacity in lakes, wetlands and paramo ecosystems, while built reservoirs offer limited storage capacity with prohibitive infrastructure costs. Water supplies for some of Colombia's largest cities, including Bogotá, are fed by paramos, while more than 80 percent of overall municipalities are supplied from small surface water sources such as streams and creeks, with low regulatory conditions and high vulnerability to ecosystem changes. Lack of adequate water management and development planning has contributed to vulnerability of water resources, including water shortages, water contamination, increased erosion and landslides and increased flooding. The main threats to water quality are mining, deforestation and consequential silting, agricultural diffuse pollution, untreated wastewater and urban runoff.¹³⁵

Similar to Peru, Colombia underwent a period of rapid economic development between 2000 and 2014, which slowed somewhat in 2015.¹³⁶ Development of mining, oil and gas, manufacturing, and construction industries has supplemented historical dependence on agriculture, while coffee and palm oil exports remain significant. Tourism and eco-tourism industries are also growing rapidly, with significant untapped potential to contribute to sustainable development.¹³⁷ Colombia has experienced a major demographic shift towards urbanization: the proportion of the population living in rural areas was 24 percent in 2015, compared to 55 percent in 1960.¹³⁸ Indigenous groups comprise a significant part of the rural population, with 710 reserves collectively owned by 102 different indigenous groups covering almost 30 percent of the entire area of the country.¹³⁹

¹³⁵ Política Nacional para la Gestión Integral del Recurso Hídrico [National IWRM Policy] (Ministerio de Ambiente, Vivienda y Desarrollo Territorial [Ministry of Environment, Housing and Territorial Development] 2010).

¹³⁶ 'GDP per capita' supra (n 4).

¹³⁷ 'REDD in Colombia' (The REDD desk) <<http://theredddesk.org/countries/colombia/statistics>> accessed 5 June 2017.

¹³⁸ 'Rural population (% of total population)' (The World Bank: Data) <<https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS>> accessed 12 January 2018.

¹³⁹ REDD in Colombia supra (n 138).

Political insecurity has been an overarching factor in land use and ownership trends over the past several decades. Five decades of conflict between government forces and the Revolutionary Armed Forces of Colombia subsided in 2006 and formally ended with a peace agreement reached in 2016.¹⁴⁰ The conflict caused substantial displacement of rural people, driving the rapid trend towards urbanization and resulting in massive informal settlements lacking tenure security and basic infrastructure. Colombia's land ownership remains highly concentrated as a result of its historical colonial structure, with less than one percent of landholders in control of more than half of land suitable for agriculture, and remaining rural land being occupied by a large number of smallholders. Forty-eight percent of the 3.7 million rural parcels contained in the National Cadastre do not have registered titles, and an estimated additional 1.7 million rural properties exist without formal property records. Past government attempts to foster land reform have been ineffective, largely due to political instability, while this may be changing. As a part of the peace process, Colombia is implementing a land titling and restitution programme, aiming to promote better equity in land distribution.¹⁴¹

Legal and institutional context. Colombia's legal system is based on the civil law tradition. Colombia introduced a new constitution in 1991,¹⁴² it's second in the 20th century. It establishes Colombia as a democratic, social state, organized as a unitary, presidential republic.¹⁴³ The executive branch of government is established with dominant powers over legislative and judicial branches of government,¹⁴⁴ and is composed of the president and vice president, cabinet ministers and administrative directors appointed by the president.¹⁴⁵ The president is declared the chief of state, the head of government and the supreme administrative authority.¹⁴⁶ Legislative power is

¹⁴⁰ 'Texto completo del Acuerdo Final para la Terminación del Conflicto y la Construcción de una Paz Estable y Duradera [Complete text of the Final Agreement to End Conflict and Construct Stable and Lasting Peace] (Oficina del Alto Comisionado para la Paz, Gobierno de Colombia [Office of the High Commissioner for Peace, Colombia]). <<http://www.altocomisionadoparalapaz.gov.co/procesos-y-conversaciones/Paginas/Texto-completo-del-Acuerdo-Final-para-la-Terminacion-del-conflicto.aspx>> accessed 5 June 2017.

¹⁴¹ 'USAID Country Profile - Property Rights and Resource Governance: Colombia' (USAID 2017)<https://www.land-links.org/wp-content/uploads/2017/01/USAID_Land_Tenure_Colombia_Profile_Revised_December-2017.pdf> accessed 5 June 2017.

¹⁴² Colombia's Constitution of 1991 with Amendments through 2005 (English translation by MW Coward et al, the Constitute Project 2018).

¹⁴³ *ibid*, Art. 1.

¹⁴⁴ *ibid*, Art. 113.

¹⁴⁵ *ibid*, Art. 115.

¹⁴⁶ *ibid*, Arts. 115 and 189.

vested in a congress composed of an elected senate and an elected house of representatives.¹⁴⁷ The administrative function of government, including the development of policies, is delegated to ministers and administrative directors.¹⁴⁸ Ministers may issue regulations pursuant to statutes, subject to approval of the President, and may be delegated to issue resolutions on specific matters within their competence.¹⁴⁹ Individually, the president may issue decrees on any governmental activity.¹⁵⁰

The constitution establishes the principle of decentralization, with autonomy of its territorial units.¹⁵¹ The division of the territory and the functions of subordinate levels of government must be determined by the national government under statute.¹⁵² The constitution provides that departments, districts, municipalities and indigenous reservations are territorial entities, and that by statute, regions and provinces may also be formed with the status of territorial entities.¹⁵³ Territorial entities enjoy autonomy for the management of their interests within the limits of the constitution and state, including exercise of jurisdiction over delegated subject matters, with powers to pass local decrees and ordinances¹⁵⁴ and to impose taxes necessary for the exercise of their functions.¹⁵⁵

The constitution establishes a governance regime for departments, led by elected governors¹⁵⁶ and a municipal regime, led by elected mayors.¹⁵⁷ There are currently 32 departments and 1,122 municipalities, and Bogotá is established under the constitution as the District Capital, with a separate governance regime that encompasses the roles normally undertaken by both municipalities and departments.¹⁵⁸ Governors and mayors are considered agents of the president, may be delegated administrative functions from the president and may be removed from office by the president.¹⁵⁹ There is also a strong central planning framework in place that guides the

¹⁴⁷ *ibid*, Arts. 114, 132 and 150.

¹⁴⁸ *ibid*, Arts. 208-209.

¹⁴⁹ *ibid*, Art. 211.

¹⁵⁰ *ibid*, Art. 189.

¹⁵¹ *ibid*, Art. 1.

¹⁵² *ibid*, Art. 285.

¹⁵³ *ibid*, Arts. 286.

¹⁵⁴ *ibid*, Arts. 300 and 313.

¹⁵⁵ *ibid*, Arts. 287.

¹⁵⁶ *ibid*, Arts. 297-310.

¹⁵⁷ *ibid*, Arts. 311 -321.

¹⁵⁸ *ibid*, Arts. 322-328.

¹⁵⁹ *ibid*, Arts. 260, 303, 314 and 315.

activities of ministries, departments and municipalities. Under the constitution, a National Development Plan (Plan Nacional de Desarrollo, PND) must be developed by the government within 6 months following each new presidential term. The PNDs are reviewed by a planning council that includes representatives from territorial entities, and implementing legislation is enacted by congress.¹⁶⁰

The constitution also contains comprehensive provisions on the environment. It establishes the rights of people to a healthy environment, including the right to participate in environmental decision-making.¹⁶¹ While the constitution does not set out the scope and substance of environmental rights, it does provide that environmental rights are considered collective rights rather than individual rights, and protect the common interest in the environment and the public benefits provided by ecosystems.¹⁶² While private property rights are guaranteed, they are subject to social and environmental obligations – a direct translation of this provision states that property is a social function that implies obligations, and that ecological function is inherent to property.¹⁶³ While the ES terminology is not used explicitly, it is reflected in the language around benefits provided by ecosystems and ecological function. There is a corresponding state duty to conserve and protect ecosystems and their diversity, to conserve areas of special ecological importance, and to ensure the sustainable development of natural resources.¹⁶⁴

The *General Environmental Law*¹⁶⁵ designates the Ministry of Environment and Sustainable Development (Ministerio del Medio Ambiente y Desarrollo Sostenible - MADS)¹⁶⁶ with responsibilities for national policies, programmes, regulations and institutions for environmental protection and natural resource management.¹⁶⁷ It also defines Autonomous Regional Corporations (Corporaciones Autónomas Regionales - CARs) as regional environmental management institutions and assigns them broad functions to manage natural resources within their territories, and to

¹⁶⁰ *ibid*, Arts. 339-344.

¹⁶¹ *ibid*, Art. 79.

¹⁶² *ibid*, *Ibid*, Art. 88.

¹⁶³ *ibid*, *Ibid*, Art. 58.

¹⁶⁴ *ibid*, *Ibid*, Art. 80.

¹⁶⁵ Law 99 of 1993

¹⁶⁶ For clarity, the ministry assigned these functions is referred to as 'MADS' throughout the discussion. However, before 2003, it was called the Ministry of Environment (Ministerio del Medio Ambiente - MMA); in 2003 it was merged with the housing and economic development portfolio, becoming the Ministry of Environment, Housing and Territorial Development (Ministerio del Ambiente, Vivienda y Desarrollo Territorial - MAVDT); in 2010, a new environment ministry was re-established under the current name – MADS.

¹⁶⁷ Law 99 of 1993, Art. 5.

promote sustainable development according to policies established by MADS.¹⁶⁸ CARs are corporate entities with public charters. They do not have regulatory authority, but administer environmental regulations, policies and programmes within their jurisdictions. There is a hierarchical relationship in which departments and municipalities are subordinate to the CARs, and CARs (and other territorial entities, such as indigenous governments) are subordinate to MADS.¹⁶⁹ The law requires both departments and municipalities to support CARs in implementing environmental programmes and projects, consistent National Development Plans and national environmental policies.¹⁷⁰

CARs have played a role in decentralized environmental management in Colombia since the 1950s. They stand out among the institutions in other Latin American countries that have been much slower to decentralize environmental governance, in Colombia's own history of centralized power in other matters. While they were originally envisioned to have geographic boundaries aligned with watersheds, each of Colombia's departments lobbied for its 'own' CAR, and there are now 33 CARs aligned with departmental boundaries and the capital district of Bogotá.¹⁷¹ CARs receive funds from the national budget, and generate independent sources of revenue including through: pollution charges, taxes on property and electricity, an environmental trust fund, a percentage of fines awarded for environmental violations, and fees from licenses, permits, authorizations, and concessions.¹⁷² With respect to water resources management, the responsibilities delegated to CARs include developing watershed management plans, water allocation and water use permitting, controlling water pollution from point and non-point sources, and implementing programmes for conservation of ecosystems.¹⁷³ Municipalities are responsible for provision of drinking water and sanitation services.¹⁷⁴ Recently, the national government is

¹⁶⁸ Law 99 of 1993, Art. 23; A Blackman, R Morgenstern and E Topping, *Institutional Analysis of Colombia's Autonomous Regional Corporations* (Resources for the Future 2006).

¹⁶⁹ *ibid.*

¹⁷⁰ Law 99 of 1993, Art. 63.

¹⁷¹ Blackman, Morgenstern and Topping *supra* (n 168).

¹⁷² Law 99 of 1993, Art. 46.

¹⁷³ Law 99 of 1993, s. 31.

¹⁷⁴ Law 99 of 1993, Art. 66; Blackman, Morgenstern and Topping *supra* (n 168).

progressively taking back a centralised coordination function through national plans to guide water management and services delivered by local governments and CARs.¹⁷⁵

A National Integrated Water Resource Management Policy introduced in 2010¹⁷⁶ sets the objective for ecosystem-based watershed management, and specifically notes the need to better understand relationships between ecosystems and ecosystem services. The Policy notes that a government study estimated the economic benefits of water regulation and supply flows provided by ecosystems generated for Colombian society were 20 billion pesos in 2008. Colombia's national development plans have also progressively established an ecosystem-services based approach to environmental management. Ecosystem services are framed in the context of risk reduction, recognizing links between ecosystems degradation and conflict, social unrest and increasing risks due to natural disasters.¹⁷⁷ The plan for 2014-2018 in particular elaborates on the theme of 'green growth' and cites the expansion of extractive industries, agriculture, and urbanization as causes of ecosystem degradation that diminish the economic gains they provide.¹⁷⁸

Overview of the legal framework for payments for ecosystem services. Colombia has enacted a legislative and regulatory framework to enable and guide PES for the protection of drinking water. It applies to the government entities involved in water service delivery, and does not affect other PES schemes that might be developed independently by private parties or other public entities. Legislative reforms to address PES were introduced to support delivery of a government mandate to promote PES, with a priority on water, as directed under a series of PNDs. The first reference to PES is located in the PND for 2006-2010,¹⁷⁹ directing MADS to support the development of economic and financial instruments to incentivize the conservation of ecosystems,

¹⁷⁵ JD Lopez-Murcia 'Water supply and sanitation in Colombia: From decentralisation to recentralisation' (Global Water Trends, 16 March 2015) <<http://www.globalwaterforum.org/2015/03/16/water-supply-and-sanitation-in-colombia-from-decentralisation-to-recentralisation/>> accessed 14 April 2018.

¹⁷⁶ National IWRM Policy supra (n 35).

¹⁷⁷ Plan Nacional de Desarrollo [National Development Plan] 2010-2014: Prosperidad Para Todos [Prosperity for All] (Departamento Nacional de Planeación, Gobierno de Colombia [National Planning Department, Government of Colombia] 2010), implemented by Law 1450 of 2011.

¹⁷⁸ Plan Nacional de Desarrollo [National Development Plan] 2014-2018: Todos por un Nuevo Pais [Together for a New Country] (Departamento Nacional de Planeación, Gobierno de Colombia [National Planning Department, Government of Colombia] 2014), implemented by Law 1753 of 2015.

¹⁷⁹ Plan Nacional de Desarrollo [National Development Plan] 2006-2010: Estado Comunitario: Desarrollo para Todos [Community State: Development for All] (Departamento Nacional de Planeación, Gobierno de Colombia [National Planning Department, Government of Colombia] 2006), implemented by Law 1151 of 2007.

including developing any necessary legal mechanisms to allow for creation of a system of payments for ecosystem services.¹⁸⁰

The subsequent PND for 2010-201¹⁸¹ elaborated on an ES-based approach to environmental planning. It lists among the top priorities: the mapping of wetlands, páramos, forests, and coastal areas and their associated ecosystem services; the development of tools to value ecosystem services; integration of ecosystem service values into land-use planning; the promotion of payments for ecosystem services schemes; and, the development of a plan for national implementation of REDD+.¹⁸² With respect to water resources, it mandates MADS to develop economic instruments to provide incentives for watershed conservation and efficient water use; and to encourage investments from the private and public sectors in water management.¹⁸³

The current PND for 2014-2018¹⁸⁴ sets a mandate to elaborate mapping of ecosystem services related to water, including pressures on ecosystem services from urban centres, agriculture and industry, and identification of areas of high water vulnerability. It also requires the development of a regional strategy for Bogotá watershed, which is already known to be high risk in terms of water insecurity. It states that this strategy should include promotion of mechanisms for the protection of ecosystem services associated with water supply.¹⁸⁵

Each of the PNDs is accompanied by implementing legislation, each of which has made progressive amendments to Colombia's General Environmental Law, building out the legal foundation for PES. Legislation implementing the PND for 2006-2010, introduced in 2007, provided legal authorization for PES for source water protection specifically. Amendments were made to provisions of the General Environmental Law, which required departments and municipalities to invest in 1 percent of total revenues in source water protection.¹⁸⁶ The amendments specifically authorized the application of funds set aside for source water protection to be used towards financing PES schemes.¹⁸⁷ Legislation to implement the 2010-2014 PND made further amendments

¹⁸⁰ *ibid*, p. 359 (direct translation by author).

¹⁸¹ National Development Plan 2010-2014 *supra* (n 177).

¹⁸² *ibid*, p. 578.

¹⁸³ *ibid*, p 430.

¹⁸⁴ National Development Plan 2014-2018 *supra* (n 178).

¹⁸⁵ *ibid*, p. 811.

¹⁸⁶ Law 99 of 1993, Art. 111.

¹⁸⁷ Law 1151 of 2007, Art. 2016, amending Law 99 of 1993, Art. 111.

stating that CARs must define priority areas for the implementation of PES for source water protection in accordance with regulations developed by MADS.¹⁸⁸

Consequently, MADS introduced a regulation by Executive Decree¹⁸⁹ (PES Regulation) in 2013 to promote and regulate the development of PES to protect hydrological services. The PES Regulation applies to PES carried out by local governments for the protection of municipal water supplies, in accordance with the provisions requiring source water protection under the General Environmental Law. For the purposes of the PES Regulation, ‘payment for ecosystem service’ is defined as a contract to provide incentives for the conservation or restoration of ecosystems that are associate with the provision or improvement of ecosystem services associated with water resources, entered into between local governments and landowners or land possessors who are located in areas of strategic importance.¹⁹⁰ ‘Areas of strategic importance’ are defined as areas of importance to the conservation of water resources that supply municipal and regional aqueducts – requiring a direct link to drinking water.¹⁹¹

The preamble to the PES Regulation states that its objective is to provide adequate direction to ensure that funds are invested effectively towards securing ecosystem services in areas of strategic importance. It also aims, via implementation of PES schemes, to strengthen societal recognition of the value of water resources and biodiversity to the country.¹⁹² It sets out rules for local governments and other territorial entities to engage private landowners and land possessors in establishing PES schemes, with guidance from higher levels of government. The PES Regulation is binding on local governments, CARs, and other territorial entities, directing their participation in PES from the level of strategic planning to the detailed content of PES contracts.¹⁹³ In 2015, the first PES agreements negotiated under the Regulation were implemented, involving the municipality of Villapinzón and 16 families owning 200 hectares of riverfront properties along the Bogotá river.¹⁹⁴ It is also worth noting that the Nature Conservancy, with the Latin American Water

¹⁸⁸ Law 1450 of 2011, Art. 210, amending Art. 111 of Law 99 of 1993.

¹⁸⁹ Ministerio de Ambiente y Desarrollo Sostenible, Decreto No. 953 (17 Mayo 2013) (MADS Decree 953 of 2013).

¹⁹⁰ *ibid*, Art. 3.

¹⁹¹ *ibid*, Art. 1.

¹⁹² *ibid*, Preamble.

¹⁹³ *ibid*, Art. 2.

¹⁹⁴ ‘Primeros pagos por servicios ambientales hídricos con recursos 100% públicos [First payments for ecosystem services with 100% public resources]’ (MADS, 20 March 2015) <<http://www.minambiente.gov.co/index.php/component/content/article/2-noticias/1710-primeros-pagos-por-servicios-ambientales-hidricos-con-recursos-100-publicos>> accessed 14 April 2018.

Partnership, has led seven PES projects in Colombia, establishing water funds to protect páramo ecosystems in watersheds collectively serving 16 million people in urban centres.¹⁹⁵ The PES Regulation would apply to local governments and CARs participation in such funds.

5.3.2 PES Actors, Administration and Oversight

Administration and oversight. The PES Regulation requires close collaboration between local governments (municipalities and the capital district of Bogotá) and CARs in establishing PES schemes, with oversight from MADS. The PES Regulation states that MADS may issue guidelines for the design and implementation of PES, and may provide funding and technical assistance to CARs to coordinate and promote PES.¹⁹⁶ This may include issuing directives regarding the identification, location, and prioritization of strategic areas for PES.¹⁹⁷ MADS is also directed in the most recent PND to maintain a National Committee on Ecosystem Accounting to consolidate information on ecosystem service values, which provides a basis for developing economic tools to value ecosystem services, including PES.¹⁹⁸

CARs fulfill a role of planning, coordination and technical expertise, and their key task is to create maps defining areas of strategic importance to water resources in order to target PES. Local governments may request that CARs provide advice on strategic areas for PES in cases where a map or watershed plan does not yet exist.¹⁹⁹ CARs then provide further technical assistance to local governments to identify individual properties that may be eligible to participate in PES, based on enumerated ecological criteria that are discussed below.²⁰⁰ Local governments or other territorial entities participate directly as parties to the PES agreement. Within the guidance provided by CARs, they are responsible for negotiating individual PES agreements with landowners and landholders on targeted properties. Once agreements are finalized, local governments must register each PES agreement with their regional CAR, which then submits a list of PES agreements each year to MADS,²⁰¹ while there does not appear to be a centralized public registry as in Peru.

¹⁹⁵ 'Investing in nature to secure fresh water for Colombia's most at-risk cities' (The Nature Conservancy) <<https://www.nature.org/ourinitiatives/regions/latinamerica/colombia/explore/colombia-water.xml>> accessed 14 April 2018.

¹⁹⁶ MADS Decree 953 of 2013, Art. 9.5, para. 4.

¹⁹⁷ MADS Decree 953 of 2013, Art. 4.

¹⁹⁸ National Development Plan 2014-2018 supra (n 178), p. 680.

¹⁹⁹ MADS Decree 953 of 2013, Art. 4.

²⁰⁰ MADS Decree 953 of 2013, Art. 5.

²⁰¹ MADS Decree 953 of 2013, Art. 14.

Beneficiaries, buyers and funding. The PES schemes developed pursuant to the PES Regulation are funded by the local governments that directly depend on the ecosystem services being protected in order to provide drinking water within their jurisdictions. PES remains voluntary on the part of local governments who may choose to undertake PES as part of drinking water strategies; however, if PES is undertaken, it must be carried out in accordance with the Regulation. While local governments and departments are required under the General Environmental Law to allocate at least 1 percent of their annual revenues to watershed conservation for source water protection, this does not necessarily have to be achieved via PES.²⁰² It may be achieved by other activities, including the direct purchase of land.²⁰³ The Regulation also explicitly authorizes local governments, CARs and other territorial entities to involve any private entities in the development of PES schemes, which could include raising additional funds to support PES.²⁰⁴ It also stipulates that funds may be directed not only towards incentives, but also towards activities associated with PES, such as land title surveys, commercial appraisals, and legal expenses.²⁰⁵

In addition to the municipal budgets, 1 percent of departmental budgets must also be dedicated to source water protection, and potentially directed to PES. It is unclear in the Regulation whether departments would fund PES as direct parties to an agreement, or provide funding to local governments who would enter into agreements. Regarding allocation of departmental resources for PES, the Regulation provides broad guidance that departments should allocate resources towards properties that will benefit the greatest number of municipalities and achieve greatest efficiency for the impact of investment.²⁰⁶

The General Environmental Law establishes other types of fees for environmental compensation that may be future sources of funding for PES. For example, any project involving water abstraction from natural sources (for bottled water, recreation, irrigation or industrial use), must pay a fee based on 1 percent of the total investment in the project, to be dedicated to the improvement and monitoring of the respective watershed.²⁰⁷ Similarly, hydroelectric projects must

²⁰² Law 99 of 1993, Art. 111.

²⁰³ *ibid.*

²⁰⁴ MADS Decree 953 of 2013, Art. 11.

²⁰⁵ MADS Decree 953 of 2013, Art. 13.

²⁰⁶ MADS Decree 953 of 2013, Art. 11

²⁰⁷ Law 99 of 1993, Art. 43.

pay a fee based on 6 percent of energy sales, part of which is directed to environmental protection measures within the watershed.²⁰⁸

Eligibility for payments. The PES Regulation provides sparse guidance on the requirements for potential participants to be eligible to receive payments, besides ecological considerations related to their property. In the definition of ‘payment for ecosystem service’ the Regulation refers to contracts with property owners or possessors, but it does not elaborate further or provide examples. In listing a number of terms that must be included in PES contracts, it does include terms requiring verification of the identification and land title or possession status of the payments recipients. The contract must include: the name and national identification number of the recipient, a copy of the property registration and cadastral certificate, or a copy of a land title certificate showing possessory rights, in accordance with provisions on possessory rights set out in Colombia’s Civil Code. The Regulations also stipulate that recognition of a party as a recipient of PES incentive does not in any way establish ownership or an interest in land.²⁰⁹ This process will exclude those without formalized land tenure, with the potential to deepen inequities faced by individuals or communities without secured land rights, or who are in the midst of a lengthy process to secure land rights.

The Regulation does include guidance on the prioritization of lower-income participants, pointing to some intention that equity and rural development objectives be achieved via PES. While properties must be selected principally based on ecological criteria, if these criteria are satisfied, secondary considerations include giving priority to ‘lower-income’ landowners and possessors. There is no reference to any specific income baseline, guidance on the relative weight to be given to relative income as a factor, or reference to other socio-economic indicators. The Regulation also stipulates that incentives should generally be limited to a maximum of fifty hectares that are owned by each participant. However, larger areas with a single owner may be considered if all other criteria are met and it is not viable to conserve ecosystems on the property by other means.²¹⁰

There is no reference made in the Regulation to any rights or property interest vested in ecosystem services themselves. Likewise, the definition of ‘payment for ecosystem service’ does

²⁰⁸ Law 99 of 1993, Art. 45.

²⁰⁹ MADS Decree 953 of 2013, Art 9.3.

²¹⁰ MADS Decree 953 of 2013, Art. 9.1.

not characterize it as an exchange for ecosystem services as a type of commodity. Rather, it is characterized as a conservation incentive, provided for the protection or restoration of ecosystems in areas associated with ecosystem services.

5.3.3 PES Design

Targeting ecosystem services. The PES Regulations limits the scope of ecosystem services that are targeted for payments to ecosystem services associated with water resources, which are further defined as services derived from the functioning of ecosystems that provide sources of water for municipalities and regions.²¹¹ Maintenance of the water cycle and control of sediment levels are provided as examples of such ecosystem services.²¹² However, the specific ecosystem services that are the subject of PES agreements must be determined based on technical analysis carried out by CARs, and referenced in individual PES agreements.²¹³

Detailed rules are set out on the further targeting of priority areas for PES and the selection of individual sites. As groundwork for PES, CARs are required to identify, define and prioritize areas of strategic importance to drinking water. This determination may be based on information contained in existing watershed management plans, environmental management plans and other instruments for environmental planning that contain information related to water resources.²¹⁴ From within these strategic areas, local governments work with CARs to select potential properties and to define the ecosystem services that are the object of PES agreements. The Regulation allows that territorial entities may fund PES on properties that are outside their own jurisdiction, provided that the properties are within areas of strategic importance for water resources within their jurisdiction.²¹⁵ This allows for watershed planning for PES where jurisdictional boundaries do not match watersheds.

The PES Regulations set out factors that should be taken into account in evaluating individual properties, with higher priority given to the following indicators:²¹⁶

- The presence of water streams, springs and wetlands on the property;

²¹¹ MADS Decree 953 of 2013, Art. 3 (direct translation by author).

²¹² MADS Decree 953 of 2013, Art. 3.

²¹³ MADS Decree 953 of 2013, Art. 7.

²¹⁴ MADS Decree 953 of 2013, Art. 4.

²¹⁵ MADS Decree 953 of 2013, Art 10.

²¹⁶ MADS Decree 953 of 2013, Art. 5.

- The size of the population supplied by the aqueducts that benefit from the conservation of the area in which the property is located;
- The significance of the property to feeding water supply, including recharging aquifers;
- The significance of the property to the quality of water supplied to downstream aqueducts;
- The proportion of land cover on the property comprised of natural ecosystems with little or no alteration;
- The degree of anthropogenic threats to natural ecosystems on the property;
- The sensitivity of natural ecosystems on the property;
- The connectivity of ecosystems between the property and existing protected areas.

The Regulations do not provide guidance on the relative weight to be given to the various factors or the means by which they may be measured. Within the legal framework, this would be within the technical role assigned to CARs, with potential support from MADS. Once properties are prioritized based on the criteria above, the Regulations also set out overarching principles as secondary considerations, including:²¹⁷

- Priority should be given to incentives for the conservation of natural vegetation;
- Priority should be given to properties where there is greater risk of deterioration of ecosystem services in the absence of an incentive.

Structure of incentive and payment terms and conditions. The PES Regulation allows for both cash and in-kind incentives, within the scope of the definition of payment for ecosystem service.²¹⁸ It also requires that the PES agreement be formalized in a written contract, and enumerates a number of minimum terms that must be adhered to or included:²¹⁹

- The value of the incentive must be stated in the agreement. Furthermore, it must correspond to a benchmark value established for all properties within a given area of strategic importance (so that all payments to participants within a designated area are the same and transparent);
- The frequency of payment (without specifying what the frequency should be);
- A description of the condition of the property, including the extent of land cover consisting of natural vegetation;

²¹⁷ MADS Decree 953 of 2013, Art. 9.3

²¹⁸ MADS Decree 953 of 2013, Art 3.

²¹⁹ MADS Decree 953 of 2013, Art. 9.3.

- Limitations on land use within the agreed area, including the maintenance or restoration of vegetation, and any acceptable sustainable land uses that provide income outside the incentive;
- The term of the contract, which may be up to but not exceeding five years;

Where the incentive is applied towards ecosystem restoration, participants must prove that the selected properties were not covered by natural ecosystems in the prior five years. This may be demonstrated via aerial photographs or satellite images, or historical records of land cover in government archives, or other forms of proof provided by potential participants.²²⁰

The Regulation also provides guidance on the analysis that must be undertaken by CARs, local governments or other territorial entities in determining the value of the incentive for a particular area of strategic importance:²²¹

- Opportunity cost should serve as a benchmark for the appropriate level of the incentive, and shall be calculated based on the type of productive land use most represented in the relevant area of strategic importance. Either of the following two options may be used in the calculation:
 - The equivalent of net economic benefits generated by the productive land use; or,
 - The cost of leasing land for such activities.
- The maximum annual value of the incentive per hectare shall be determined using the lowest average opportunity cost in the area of strategic importance.
- Furthermore, the annual value of the incentive must not exceed 15 percent of the average commercial appraisal value per hectare of properties located in the area of strategic importance.

The Regulation stipulates additional rules to reduce the potential for high payments going to wealthier owners of large properties:

- Areas less than or equal to 50 hectares may receive the full maximum annual incentive.
- For areas above 50 hectares, a per hectare rate of 75 percent of the annual incentive will be applied;
- For areas above 100 hectares, a per hectare rate of 50 percent of the annual incentive will be applied;

²²⁰ MADS Decree 953 of 2013, Art. 9.

²²¹ MADS Decree 953 of 2013, Art 9.2.

Finally, the Regulation sets out a general guiding principle that among options of a similar conservation value, the most cost-efficient option should be prioritized.²²²

Monitoring and enforcement. The PES Regulation requires that at the time a PES agreement is formed, CARs or other territorial entities must take measures to verify the condition of the land and compliance with the agreed-on land uses, prior to the payment of the incentive. They must also carry out periodic monitoring in order to verify continued compliance with all contractual obligations of PES agreements.²²³ Furthermore, payment recipients must provide documents demonstrating the current status of land title or possessory land rights before each payment is made.²²⁴

The PES Regulation also requires contracts to include terms dealing with breach of obligations by the recipient: PES contracts must include provision for fines in the case of breach of obligations, and allow for the unilateral termination of the contract by the territorial entity for breach of obligations by the recipient. Guidance is not provided on the appropriate amount of the fines, or whether they should be restorative (i.e. repayment of an amount corresponding to the incentive), or set at a higher level that would be punitive.

5.4 Discussion and Conclusions

The introduction of specific laws to regulate PES is a recent and novel development. Peru and Colombia have become leading jurisdictions by establishing this type of legal framework, considered “groundbreaking” in advancing PES as a tool for ecosystem conservation.²²⁵ These examples create a regulatory framework for PES, authorizing and promoting voluntary, decentralized development of PES within regulatory limits. Both legal frameworks establish central government oversight over PES schemes and set out the responsibilities of designated agencies with respect to PES. To this extent, they share some characteristics with the ‘establishing’ legal frameworks examined in Chapter 4, but are distinguishable in that there is no specific PES scheme established by the law; rather, the regulatory framework applies to any number of PES schemes that operate independently. The Peruvian and Colombian legal frameworks both also provide enabling authorities to authorise public entities to participate in PES and to authorise the use of public funds towards PES. In this way, these examples share some characteristics with the

²²² MADS Decree 953 of 2013, Art 9.2.

²²³ MADS Decree 953 of 2013, Art. 9.4.

²²⁴ MADS Decree 953 of 2013, Art. 9.3.

²²⁵ Bennett and Carroll *supra* (n 86), ix.

‘enabling’ frameworks examined in Chapter 6, but are distinguishable by the existence of detailed rules that create a regulatory regime specifically for PES.

The discussion below elaborates on the role of these ‘regulating’ legal frameworks in PES governance, comparing how the two examples deal with some of the key themes related to ES-based approaches and PES that were identified in Chapter 2 and Chapter 3.

The role of government and institutions for PES. In both cases, the legal frameworks create a substantial role for the national government to oversee PES without actually being party to PES agreements. The central government is not involved in either case in selecting specific properties or setting incentive levels for PES, but the design and administration of PES must be carried out in accordance with criteria set out in law. The Peruvian law is broadest in its regulatory reach, establishing national jurisdiction to regulate all PES in the country. The Registrar, when fully implemented, will create a vetting and approvals process, authorising the national government to intervene if rules are not being followed. The Colombian law provides guidance in the more specific context of protecting drinking water sources, and regulates the participation of local and regional levels of government in PES, in a context where these subordinate levels of government are already subject to national law in carrying out their general duties and functions. Both legal frameworks also establish a role for the central government, and local and regional governments to a greater degree in the case of Colombia, in carrying out research and coordinating technical information among parties.

Government oversight was considered particularly important in Peru in order to protect the rights of local communities and ensure their access to information, in the context of growing interest from cities to develop watershed PES schemes, and from international actors to develop REDD schemes, often in remote communities.²²⁶ At the same time, public statements by MINAM following the passage of the law emphasize that PES remains voluntary and that the government is not intervening in the administration of specific schemes.²²⁷ Both legal frameworks support greater transparency and accountability in how PES is carried out, with a view to protecting the public

²²⁶ ‘Perú hacia la aprobación de una Ley de Mecanismos de Retribución por Servicios Ecosistémicos [Peru nearing approval of MRSE Law]’ (Forest Trends, 15 April 2014) <https://www.forest-trends.org/ecosystem_marketplace/peru-hacia-la-aprobacion-de-una-ley-de-mecanismos-de-retribucion-por-servicios-ecosistemicos/> accessed 3 May 2018.

²²⁷ ‘Se promulga la Ley de Mecanismos de Retribución por Servicios Ecosistémicos [MRSE Law is passed]’ (MINAM 30 June 2014) <www.minam.gob.pe/notas-de-prensa/conoce-como-funciona-la-recien-aprobada-ley-de-servicios-ecosistemicos/> accessed August 5, 2015.

interest in ES. The Peruvian law also goes furthest by providing the public with access to information through the Registry, which, when fully implemented, will provide any interested with information on PES schemes in the country and the actors involved. Statements by MINAM and Forest Trends indicate that the main objective in introducing the MRSE law in Peru was to provide regulatory certainty and protect the rights of PES participants, in order to encourage PES project development and involve actors from a range of public and private sectors.²²⁸ One study found that the number of PES projects in Peru doubled between 2013 and 2015, which the researchers attributed largely to increased regulatory certainty and government facilitation of agreements.²²⁹

Some early research based on interviews with PES practitioners in Peru indicate that weak government institutions and lack of coordination between different levels of government and different sectors has been a challenge in implementing the new MRSE law, while noting at the same time that the law has helped in this regard, by clarifying roles and relationships and providing an impetus for organising PES.²³⁰ Others have also observed that the influence of international NGOs in guiding the coordination and implementation of PES has been significant, including the influence of REDD+ readiness requirements as a driver to develop the law.²³¹ While there is limited available commentary on the PES Regulation in Colombia, some research observes that it provided much needed clarity and structure to guide local governments and CARs to establish PES. It is noted that previous attempts to create incentive-based watershed conservation schemes in the 1980s failed due to government incapacity and instability.²³²

Commentary discussing the potential for laws to specifically address PES notes that while such laws may provide greater clarity and structure, there is a need to ensure they do not impose

²²⁸ Peruvian Congress Passes Historic Ecosystem Services Law *supra* (n 60); MRSE Law is passed *supra* (n 227).

²²⁹ M Quintero and P Pareja P 'Estado de Avance y Cuellos de Botella de los Mecanismos de Retribución por Servicios Ecosistémicos Hidrológicos en Perú [State of Progress of MRSE for Hydrological Services in Peru] (Centro Internacional de Agricultura Tropical [International Centre for Tropical Agriculture] 2015).

²³⁰ EG Sánchez 'Estrategia para la mejor gestión de los Mecanismos de Retribución por Servicios Ecosistémicos Hídricos en Lima (Perú) a través del análisis de actores [Strategy to improve governance of Retribution Mechanisms for Water Ecosystem Services in Lima (Peru) through a stakeholder analysis] (2016, Proyecto de fin de grado, Universidad Polytechnica de Madrid [Final degree project, Polytechnic University of Madrid]) <<http://oa.upm.es/44636/>> accessed 5 February 2018.

²³¹ JL Capella Vargas 'Política pública y ambiente en el Perú: la ley de mecanismos de retribución por servicios ecosistémicos y los factores que permitieron su aprobación' [Public policy and environment in Peru: the MRSE law and factors that allowed its approval] (2016, Tesis para optar el título de Magíster en Ciencia Política, Pontifica Universidad Catolica del Peru [Masters Thesis, Political Science, Pontifica Catholic University of Peru]) <<http://tesis.pucp.edu.pe/repositorio/handle/123456789/7961>> accessed 5 February 2018.

²³² EL Medina Ríos '¿Es el pago por servicios ambientales, PSA, la solución para evitar la deforestación?' [Are payments for ecosystem services the solution to avoid deforestation?] (2016) 6 *Agroforesteria Neotropical* 49.

undue administrative and regulatory burdens that hamper efficiency and flexibility in PES.²³³ Some research has considered the Peruvian law from the perspective of its impact on communities implementing PES on the ground, and observes that by providing a structured framework of ground rules, but not prescribing detailed terms of PES agreements, the law supports accountability and clarity, but also flexibility for communities to develop context-specific arrangements. While the legislation is viewed by some as an imposition of bureaucratic power that might be out of touch with local reality, it is also considered potentially beneficial in strengthening community cohesion. It is seen to recognise the rights of local communities and their role in the stewardship of resources, and strengthen their negotiating capacity, providing an institutional and financial link to sources of funds to support sustainable land uses, putting them in a better position to compete against other land uses such as small scale mining.²³⁴

Application of the ES concept. The ES concept is strongly represented in both Peru and Colombia's legal framework for PES. More widely, in both countries ES has been adopted in environmental laws, strategies and plans has an important influence on the overall sustainable development agenda. In both cases the government is investing in ES-focussed research and inventories of natural capital. The PES Regulation in Colombia is much more specific in setting out strategic areas for the protection of drinking water and the factors to be considered in the selection of properties for PES, while the Peruvian law, given its wider application, is more general in how ecosystems are related to services.

Peru's MRSE Law codifies an advanced representation of the ecosystem services concept in general, setting out key terms and carefully delineating the relationship between ecosystem functions that provide ecosystem services, and the human activities which impact ecosystem functions, resulting in changes to the provision of ecosystem services. Research on the development of the MRSE Law has traced the influence of international politics and trends in transferring the concept of not just ES, but PES, into Peruvian law.²³⁵ This is considered a significant innovation in the law, and records from the policy development process and debates in Congress demonstrate the role of strong leadership from technical experts within government in

²³³ T Greiber (ed), *Payments for Ecosystem Services: Legal and Institutional Frameworks* (IUCN 2009).

²³⁴ J Bastiaensen et al. 'Water and local development in Huamantanga: A pathway interpretation of opportunities and risks of the Law of Compensation and Reward Mechanisms for Ecosystem Services in Peru' (Discussion Paper, Institute of Development Policy, University of Antwerp, 2017).

²³⁵ Capella Vargas supra (n 231).

legitimising and building support for the need for laws around PES. Another critical factor was the direct involvement of international organisations (such as Forest Trends) as well as local NGOs in early stages of policy development and throughout the legislative process. One perceived challenge for implementation is the transfer of this concept to local and regional governments.²³⁶

The rationale and theory for PES. As in Costa Rica and Ecuador, constitutional environmental rights to a healthy environment provide an underlying normative frame in Peru and Colombia that links ecosystems to human wellbeing, and also supports the role of government in managing PES in the public interest.²³⁷ The legal frameworks in Peru and Colombia both provide a framework for PES that falls somewhere in between the Pigouvian and Coase conceptualisations: while both envision decentralised PES that is not carried out or funded by the central government, neither envisions PES organised through direct bargaining. In the case of water services, they both establish a relationship between ES users and providers by directing a portion of water fees to PES, and in the case of Peru, open the door to a range of private funders. However, the involvement of private actors in PES is organised within a framework of government oversight.

In both cases, the amount of incentives is left largely up to the parties to the agreement. Peru's MRSE Regulation mentions the consideration of the economic value of ES, and costs incurred to provide ES, while Colombia's Regulation stipulates more specifically that opportunity cost should be used as a benchmark. While it represents only one study, some research has been carried out on the impact of incentive payments on participant motivations in Colombia. It compared three types of incentives for farmers to set forested land aside for conservation: a premium added to the price of crops, individual incentives per hectare of forest, and collective payments per hectare of forest. It found that applying the incentive to the price of the crop did not increase motivations for conservation, while applying a payment for protected forest land did increase motivations, and also that collective payments were most effective in encouraging social motivations.²³⁸

Research in the context of Colombia also emphasises that the statutory amendments to legally secure funds for PES by dedicating a portion of water fees to watershed conservation was

²³⁶ *ibid.*

²³⁷ A Casas and R Martínez, *Marcos legales para el pago por servicios ambientales en América Latina y el Caribe: análisis de ocho países [Legal frameworks for payments for ecosystem services in Latin America and the Caribbean: analysis of eight countries]* (Organización de los Estados Americanos [Organization of American States] 2008).

²³⁸ L Morosa, MA Vélez, E Corbera 'Payments for Ecosystem Services and Motivational Crowding in Colombia's Amazon Piedmont' (in press, accepted December 2017) *Ecological Economics* <<https://doi.org/10.1016/j.ecolecon.2017.11.032>> accessed 20 May 2018.

critical in making these schemes feasible. Absent this requirement, it is considered unlikely that water utilities and water users would be willing to pay for watershed conservation (especially where payments for watershed conservation aim to prevent future disruptions in hydrological function, as opposed to payments for ecosystem remediation or the cessation of harmful activities already taking place) because there is no perception of an immediate problem. Stakeholders generally lack awareness about the role of ecosystems in water provision, and willingness to pay may not reach a critical mass until a water crisis makes degraded ES apparent, at which point ecosystem damage is difficult to undue. From this perspective, the law to support PES is viewed as having an important role in sustainability planning to overcome short-term interests.²³⁹

Neither of the regimes in Peru and Colombia has poverty alleviation as an explicit objective, while they do enable rural development and provide some protections for marginalised communities. In a commentary on the PES Regulation in Colombia, Forest Trends notes that one of the major challenges in implementing PES under the rules is the reliance on individual municipal budgets to fund PES in their surrounding watersheds, given the imbalance in the budgets of different municipalities. This approach to funding concentrates PES spending in municipalities with a larger tax base, which may or may not correspond to watersheds that are at greatest risk or the scale of strategic areas in the watershed that should be protected. In 2013, 80 percent of Colombia's municipalities had annual budgets under US \$3 million, meaning just thirty thousand dollars would be dedicated towards conservation of strategic areas. On the other hand, large cities like the capital district of Bogotá have budgets upwards of US \$50 million, with 500 thousand dollars available annually for PES and other watershed conservation activities.²⁴⁰

Property rights and rights to ES. The legal frameworks for PES in both Peru and Colombia appear to avoid the commodification of ES. In Colombia, constitutional provisions around property and the environment set limitations on the extent to which private rights may interfere with the public interest in ecosystems - there is specific mention in the constitution of ecological function being inherent to property.²⁴¹ There is also a corresponding state duty to conserve and protect

²³⁹ Medina Ríos supra (n 232).

²⁴⁰ 'Colombia avanza en políticas para impulsar pago por servicios ambientales (Colombia advances policies to support payments for ecosystem services)' (Forest Trends 27 September 2013) <https://www.forest-trends.org/ecosystem_marketplace/colombia-avanza-en-politicas-para-impulsar-pago-por-servicios-ambientales/> accessed 3 May 2018.

²⁴¹ Colombia's Constitution supra (n 142), Art. 58.

ecosystems and their diversity.²⁴² Read with an understanding of ecosystem services, this appears to subject private property rights not only to the public interest generally, but to the protection of public benefits provided by ecosystems. In Peru, there are even stronger provisions establishing national patrimony of renewable and non-renewable natural resources,²⁴³ and an explicit duty on the state to conserve biodiversity.²⁴⁴ However, it should be acknowledged that, in practice, there may be challenges in fully realising these strong legal protections of the public interest in ES, given the context of uncertain land tenure, limited capacity for law enforcement in remote areas, and illegal land clearing occurring in both countries, as noted above.

According to an IUCN study, there was some uncertainty about the effect provisions in Peru's constitution establishing state ownership over natural resources could have on PES.²⁴⁵ It was not clear whether a transfer of interests in land or natural resource rights carried with it rights to underlying ES, or, if ownership of ecosystem services was retained by the state, whether other parties could legally receive payments for ES. The MRSE Law makes clear that while ownership of ecosystem services remains vested in the state, eligibility to receive payments is not tied to ownership of the ES themselves. Rather, payments are tied to actions that are taken to contribute to ES provision. Thus, those eligible for payments are those in a legal position to control the use of land or natural resources in a way that affects ecosystem services. Payments do not represent a 'purchase' of ecosystem services, but rather compensation for the actions taken to contribute to ES provision. Similarly, in Colombia, there is no reference made in the law to any rights or property interest vested in ecosystem services themselves. Likewise, the definition of 'payment for ecosystem service' characterises it as an incentive for protection or restoration of ecosystems in areas *associated with* ES; it is not does not characterised as an *exchange* of ES

In the case of Peru, the MRSE Law and Regulations enumerate a list of public and private actors with a range of rights and responsibilities in relation to land and natural resources who are eligible to receive payments. The Law also alleviates uncertainty about the security and enforceability of PES agreements where land tenure is unclear, since MINAM can approve payments to non-titleholders, and the PES agreement is enforceable by virtue of registration in the national registry. The registration process by which PES agreements must be evaluated and validated thus

²⁴² Colombia's Constitution *supra* (n 142), Art. 80.

²⁴³ Constitution of Peru *supra* (n 32), Art. 66.

²⁴⁴ Constitution of Peru *supra* (n 32), Art. 68.

²⁴⁵ Greiber *supra* (n 233), Annex IV.

establishes MINAM as the gatekeeper for payments, with powers of discretion to intervene if eligibility for payments or the allocation of payments is in question. In public statements about the MRSE Law, MINAM emphasizes that while PES may be a private agreement between non-state actors, the state owns the natural resources at the center of the contract and has jurisdiction to regulate PES arrangements.²⁴⁶

Policy integration. In both Peru and Colombia, one of the key objectives in developing laws to address PES appears to be to align decentralised PES with broader national priorities and planning. In Colombia in particular, the legal framework for PES is integrated within a comprehensive central planning function of the national government. The targeting of ES is also integrated with the identification of areas of strategic importance for water resources. In the case of Peru, the government has less control over the details of PES, but the legal framework does envision a role for MINAM in developing PES in areas connected with existing protected areas. More broadly, MINAM is mandated to track and report on how the implementation of PES throughout the country is contributing to national strategies for ecosystem management. Another interesting aspect of how the legal frameworks have developed in Peru and Colombia is the influence of REDD+ readiness. While REDD+ is driven by the international interest in ES provided by forests related to climate change, both Peru and Colombia are implementing legal frameworks for PES related to water at the same time as developing legal and institutional readiness for REDD+, and are integrating REDD+ payments within a broader framework for PES in the country. This enables integration in planning and implementation of PES, and potential opportunities for ‘bundling’ of payments that combine international interests in carbon with local and regional interests in water. One potential area for future research is the extent to which REDD+ implementation, based on rules to ensure verified carbon offsets, can contribute to other ES such as water, and what the role that legal frameworks such as those in Peru and Colombia, which give specific attention to water, can have in enabling those links.

²⁴⁶ MRSE Law is passed supra (n 227).

CHAPTER 6
ENABLING LEGAL FRAMEWORKS FOR PAYMENTS FOR ECOSYSTEM SERVICES:
CASE STUDIES FROM NEW YORK, ENGLAND AND ONTARIO

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6.1 Introduction

This chapter considers three case studies of legal frameworks that enable PES approaches to contribute to the protection of drinking water sources. Section 6.2 examines New York City’s PES scheme in the Catskills/Delaware watershed, which is the most narrowly focussed of the case studies geographically and jurisdictionally. Although aspects of the enabling legal framework are located in federal and state law, the NYC scheme is unique within the United States in its scale, and has garnered attention internationally as a leading example of PES.¹ Section 6.3 examines the legal framework applicable in England to support the participation of water service providers in PES, and refers to some specific catchment-level examples. Section 6.4 examines how PES is enabled at the watershed level within Ontario’s comprehensive framework for drinking water source protection, while at this time, there are no clear leading examples of PES schemes being implemented in practice or overarching government policy to explicitly support the local development of PES.

¹ T Gartner and others (eds), *Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States* (World Resources Institute 2013); JE Salzman, *A Policy Maker's Guide to Designing Payments for Ecosystem Services* (Asian Development Bank, 2009); *Payments for Ecosystem Services: A Best Practice Guide* (Defra 2013).

Section 6.5 analyses the role of these legal frameworks in shaping PES, and how this relates to the broader issues surrounding ecosystem services and PES identified in Chapters 2 and 3.

6.2 Enabling Framework for New York City’s Long Term Watershed Protection Program

6.2.1 Context and Overview of Legal Framework for PES

Environmental and economic development context. The United States is the world’s third largest country by surface area, covering about 9.8 million square kilometres on the North American continent, encompassing highly varied geography, climate and ecosystems,² and with a total population of over 323 million in 2016.³ The United States has a ‘Very High’ Human Development Index (ranked 10th in the world in 2015) according to the United Nations Development Programme rankings,⁴ and its GDP per capita in 2016 was USD \$57,638.⁵ In 2015, 99.65 percent of the population of the U.S. had access to basic and safely managed drinking water services.⁶

New York City (NYC) is the country’s most populous urban centre, located on the Eastern seaboard along the Atlantic coast of New York State. NYC developed rapidly into a major commercial and industrial hub in the 19th century, with its population reaching 3.5 million by 1900, 7.9 million by 1950 and 8.5 million in 2016.⁷ The original municipal aqueducts were constructed in 1842, achieving an impressive feat of engineering for the time, motivated by the need for a secure water supply and sanitation for the growing population.⁸ Eventually, the city reached a point where it could not rely on infrastructure expansion, and pressure to secure land in the upstream source watershed increased.

NYC’s current drinking water supply system is massive, providing approximately 4.5 billion litres of potable water daily to about 9.5 million customers in NYC and five surrounding counties,

² ‘Surface Area (sq. km)’ (The World Bank: Data)

<https://data.worldbank.org/indicator/AG.SRF.TOTL.K2?year_high_desc=true> accessed 6 May 2018.

³ ‘Population, total’ (The World Bank: Data)

<https://data.worldbank.org/indicator/SP.POP.TOTL?year_high_desc=false> accessed 6 May 2018.

⁴ ‘Human Development Data (1990-2015)’ (United Nations Development Programme, Human Development Reports) <<http://hdr.undp.org/en/data>> accessed 6 May 2018.

⁵ ‘GDP per capita (current US\$)’ (The World Bank: Data) <<https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>> accessed 6 May 2018.

⁶ ‘United States of America’ (JMP WASH Data) <<https://washdata.org/data#!/usa>> accessed 14 April 2018.

⁷ ‘NYC Population’ (NYC Department of City Planning) <www1.nyc.gov/site/planning/data-maps/nyc-population.page> accessed 17 March 2017.

⁸ M Pires ‘Watershed protection for a world city: The case of New York’ (2004) 21 *Land Use Policy* 161.

representing half the state of New York's population.⁹ The city itself covers about 789 km², with a highly urbanized landscape comprised of over fifty percent impervious surfaces.¹⁰ By contrast, the upstate (and upstream) regions to the north of the city are largely rural. Ninety percent of NYC's water is drawn from six reservoirs fed by the combined Catskill and Delaware watershed system, which covers 4136 km² to the north of the city, comprised of 73 local municipalities and eight counties.¹¹ It represents the largest unfiltered water supply in the United States, and is fed mostly by rain and snow precipitation.¹² Only nine other major cities in the United States obtain their water supply from unfiltered surface sources. Compared to these, NYC owns a relatively small proportion of land within its source watershed - prior to 1997, only about 6 percent. The *Long Term Watershed Protection Program* has included gradual land acquisition, and 38 percent of lands are now owned or under easements by NYC and New York State.

The region encompassing the Catskill/Delaware watershed remains largely forested, with 75 percent of the land occupied by woodlots, of which 85 percent are privately owned.¹³ The remaining land is comprised mainly of small to mid-sized dairy, vegetable and mixed livestock farms. The watershed continues to support very high water quality. However, key risks need to be managed on an ongoing basis, relating mainly to the impacts of agriculture. These include contamination of water with *Giardia* bacteria and viruses, increased levels of sediment, which can transport pathogens and interfere with effective filtration and disinfection, and excess nutrients, particularly phosphorous, which can cause algae blooms and eutrophication.¹⁴ Concerns about NYC's water quality increased in the 1980s due to development pressures and changing land management upstream. Leading into the development of the *Long Term Watershed Protection Program* in 1997, tensions grew between the urban water demands and land uses in the

⁹ 'Facts About The NYC Watershed' (New York State Department of Environmental Conservation) <www.dec.ny.gov/lands/58524.html> accessed 17 March 2017.

¹⁰ NYC also implements an ES approach using green infrastructure to manage storm water runoff, see: 'NYC Green Infrastructure Program' (NYC Environmental Protection) <www.nyc.gov/html/dep/html/stormwater/nyc_green_infrastructure_plan.shtml> accessed 17 March 2017.

¹¹ The remaining 10 percent of water is supplied from the Croton watershed, which requires filtration due to heavier agricultural and residential development, see: 'Facts About The NYC Watershed' supra (n 9).

¹² 'Facts About The NYC Watershed' supra (n 9).

¹³ *ibid.*

¹⁴ *ibid.*

comparatively economically depressed upstream region.¹⁵ The PES components of the Program were designed in response to this specific environmental and economic context.

Legal and institutional context. The Constitution of the United States, signed in 1787, establishes a federal system with division of powers between the federal government and state governments, and separation of powers among the legislative, executive, and judicial branches of government. Legislative powers are vested in the U.S. Congress, comprised of the Senate and the House of Representatives, both of which are elected.¹⁶ Statutes may give federal agencies powers to issue regulations with respect to specific subject matters. The President may issue Executive Orders or other directives to instruct federal government officials and agencies.¹⁷ New York State has its own government and its own constitution, established in 1894.¹⁸ The New York State Constitution also recognises the powers of local governments to elect a legislative body and adopt local laws.¹⁹

Federal, state and local governments all exercise jurisdiction in matters of environmental protection and water management. The United States Constitution does not include any reference to environmental matters. Among protections for civil rights, the Fifth Amendment to the Constitution provides that private property shall not be taken for public use without just compensation. This constitutionally entrenched private property right is an important feature of environmental law in the United States, as courts have found that environmental protections or conservation measures that too far restrict land use may be regulatory takings requiring compensation.²⁰ This was an important factor in the use of PES to supplement regulatory approaches in the NYC watershed, as upstate communities were resistant to regulations that limited control over land use and initially filed a constitutional challenge, which was withdrawn following negotiation of the *Long Term Watershed Protection Plan*.²¹

The New York State Constitution directly addresses state responsibilities for environmental protection and natural resource conservation, including original text from 1894 establishing that

¹⁵ Pires supra (n 8).

¹⁶ U.S. Constitution, Art. I.

¹⁷ U.S. Constitution, Art. II.

¹⁸ N.Y. State Constitution, Arts. III, IV, VI.

¹⁹ N.Y. State Constitution, Art. IX.

²⁰ Pires supra (n 8).

²¹ See, e.g. R Innes, S Polasky and J Tschirhart 'Takings, Compensation and Endangered Species Protection on Private Lands' (1998) 12(3) *Journal of Economic Perspectives* 35.

state forest preserves shall be “forever kept wild”.²² This provides constitutional protection against the development of forest preserves that existed at the time, which are now encompassed in two state parks - one being the Catskill Park, which feeds the NYC source watershed. Constitutional amendments in 1969 elaborated on the ‘conservation clause’, providing that state policy shall: conserve and protect natural resources and scenic beauty; encourage the use of agricultural land for food production; provide for air and water pollution control; protect agricultural lands, wetlands and shorelines; and develop and regulate water resources. Resonant of the ES, it also directs the state to acquire additional lands and waters “which because of their natural beauty, wilderness character, or geological, ecological or historical significance, shall be preserved and administered for the use and enjoyment of the people.”²³

The key environmental regulator at the federal level is the U.S. Environmental Protection Agency (EPA), an independent agency charged with the administration and enforcement of federal environmental laws and the development of regulations towards that purpose. Often, the regulatory approach of the EPA is to develop national standards that may be enforced by states through their own regulations.²⁴ Over half of the EPA budget is allocated to grants for state environmental programs and partnerships with non-governmental organizations.²⁵ The key laws for water quality protection at the federal level are: the *Clean Water Act*, which mandates the EPA to regulate pollution discharges into water and to establish quality standards for (most) surface waters across the country;²⁶ and, the *Safe Drinking Water Act*, which mandates the EPA to establish

²² N.Y. State Constitution, Art. XIV.

²³ N N.Y. State Constitution, Art. XIV

²⁴ ‘About EPA’ (*United States Environmental Protection Agency*) <www.epa.gov/aboutepa/our-mission-and-what-we-do> accessed 20 March 2017.

²⁵ *ibid.*

²⁶ Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§1251-1387, s. 319. The Act applies to “waters of the United States”; the scope of waters covered by this definition has been the subject of litigation, was clarified and broadened in an EPA regulation under President Obama (see: U.S. Army Corps of Engineers and Environmental Protection Agency ‘Clean Water Rule: Definition of ‘Waters of the United States’ (Federal Register 80 FR 37053, 29 June 2015)); and was subsequently narrowed by Executive Order of President Trump (see: ‘Executive Order 13778 - Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the “Waters of the United States” Rule’ (Federal Register 82 FR 12497, 28 February 2017)). New York and other states are suing the Trump Administration, arguing that the roll back puts drinking water sources at risk: ‘A.G. Schneiderman Leads Coalition Of 11 AGs In Suing Trump EPA For Illegal Rollback Of Clean Water Protections’ (New York State Office of the Attorney General) <<https://ag.ny.gov/press-release/ag-schneiderman-highlights-local-impacts-trump-environmental-budget-cuts>> accessed 6 May 2018.

compliance standards for all public water systems, including for water treatment processes, and quality standards for all surface and groundwater sources destined for drinking use.²⁷

The New York State Department of Health (NYSDOH) oversees the operation, design and quality of public water supplies in New York in accordance with EPA standards. Public water supply systems in New York may be owned and operated by public or private water utilities, although the majority are public and owned and operated by local governments. Since the early 1990s, the New York City Department of Environmental Protection (NYC DEP) has been the city agency responsible for NYC's water supply system. In addition to the PES components of the *Long Term Watershed Protection Program*, the NYC DEP administers a number of watershed-based regulations, respecting matters ranging from agricultural practices to wastewater treatment and effluent, stormwater controls, waste management, and application of snow melt materials.²⁸

Many types of schemes under the PES umbrella exist in the United States (with different relevant legal frameworks), including government-funded programs and conservation efforts led by non-governmental organizations. The United States Department of Agriculture Farm Service Agency implements a number of voluntary conservation programs, directed at a number of farming and ranching related conservation issues including: Drinking water protection; Reducing soil erosion; Wildlife habitat preservation; Preservation and restoration of forests and wetlands; Aiding farmers whose farms are damaged by natural disasters. In particular, the Conservation Reserve Program and Conservation Reserve Enhancement Program (CREP), while not using the PES terminology, provide yearly rental payments in exchange for farmers removing environmentally sensitive land from agricultural production, planting species that will improve environmental quality, and establishing riparian buffer zones adjacent to waterways.²⁹ As discussed below, where lands within the NYC watershed meet the objectives of the CREP, this federal program has been integrated into the overarching *Long Term Watershed Protection Program*.

²⁷ Safety of Public Water Systems (Safe Drinking Water Act), 42 U.S. Code § 300f.

²⁸ 'Watershed Protection - Regulatory Background' (New York Department of Environmental Protection) <www.nyc.gov/html/dep/html/watershed_protection/regulatory_background.shtml> accessed 20 March 2017.

²⁹ 'Conservation Programs' (United States Department of Agriculture Farm Service Agency) <www.fsa.usda.gov/programs-and-services/conservation-programs/> accessed 20 March 2017.

An ES-based approach gained traction in federal government policy relatively early compared to other countries, in the late 1990's.³⁰ There are dozens of programs implementing an explicit 'ecosystem services' approach carried out by federal agencies, ranging from PES-type agri-environmental programs and forest management partnerships to renewable energy projects, urban planning, natural disaster mitigation, and natural resources damages assessment.³¹ In 2013, the EPA released a strategic agenda for green infrastructure,³² including the use of incentives for ES-based approaches to clean water, storm mitigation and carbon sequestration.³³ The EPA has also undertaken national ES mapping, compiling data in an online public 'Enviro-Atlas'.³⁴ In 2015, under the Obama administration, a presidential directive mandated all executive departments and agencies to incorporate ecosystem services into federal decision-making.³⁵ In this broader context, the NYC *Long Term Watershed Protection Program* is often cited as an example of successful PES implementation, although it was not developed with intentional application of a PES lens or ES terminology.

Overview of the legal framework for payments for ecosystem services. Payments for Ecosystem Services are a central component of NYC's *Long Term Watershed Protection Program*, developed in the late 1990s in order to comply with the SDWA and avoid the cost of building a new filtration plant. The Program funds various activities that protect or restore water quality functions in the watershed,³⁶ including incentives for land management and conservation activities that protect and restore ecosystem services under the Watershed Agricultural Partnership (WAP) and the Watershed Forestry Program, which are the focus of this analysis. PES is accompanied by regulatory measures, a land acquisition program (with a commitment to pay fair market value for

³⁰ See, for example: *Teeming with Life: Investing in Science to Understand and Use America's Living Capital* (President's Council of Advisors on Science and Technology 1998), which looked at the state of the country's natural capital, underscoring the value of nature to the economy.

³¹ M Schaefer et al. 'Nature as capital: Advancing and incorporating ecosystem services in United States federal policies and programs' (2015) 112(24) *Proceedings of the United States National Academy of Sciences* 7383.

³² *Green Infrastructure Strategic Agenda 2013* (United States Environmental Protection Agency, 2013).

³³ *Ecosystem-Service Assessment: Research Needs for Coast Green Infrastructure* (Committee on Environment, Natural Resources and Sustainability of the National Science and Technology Council, Executive Office of the President 2015).

³⁴ 'EnviroAtlas' (U.S. Environmental Protection Agency) <www.epa.gov/enviroatlas> accessed 17 March 2017.

³⁵ M-16-01, Memorandum for Executive Departments and Agencies (Executive Office of the President of the United States, 7 October 2015) <www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m-16-01.pdf> accessed 6 May 2018. This directive has not been repealed under the Trump administration.

³⁶ *Long-Term Watershed Protection Plan* (New York City Department of Environmental Protection 2016).

land), a variety of community partnerships to support environmentally sensitive economic development.³⁷

The main component of the WAP is the development of Whole Farm Plans, which include agreement on and funding of best management practices (BMPs) to protect water quality, which may be integrated with the requirements of federally-funded conservation programs such as the Conservation Reserve Enhancement Program (CREP), which are set out in federal regulations.³⁸ The WAP also includes an Agricultural Conservation Easements Program³⁹ that purchases development rights in order to restrict land use long-term. The Watershed Forestry Program funds BMPs to protect water quality on woodlots and provides support for landowners to enrol in a state program under the New York Forest Tax Law⁴⁰, which offers tax breaks for woodland conservation.⁴¹

These PES investments in watershed protection were motivated directly by the need to meet the national standards for public water supply systems that were introduced by the federal SDWA. Specifically, the 1989 Surface Water Treatment Rule (SWTR) under the SDWA established new criteria for filtration and disinfection treatment processes for public water supplies obtained from surface water sources.⁴² For suppliers, such as NYC, whose treatment regimes did not include filtration when the rules came into effect (and use disinfection only), the SWTR provides for an exemption from the requirement to install filtration technology, at the discretion of the EPA. The EPA may issue a Filtration Avoidance Determination (FAD), which exempts a supplier from the filtration requirement if the supplier demonstrates that water quality criteria can be met without filtration. The FAD sets binding terms with which the supplier must comply in lieu of filtration.⁴³

The SWTR sets out 'avoidance criteria' that must be met in order to maintain an FAD, including: source water quality standards, operational criteria for disinfection processes, and watershed control and maintenance of an effective watershed control program, including extensive

³⁷ New York City Watershed Memorandum of Agreement (1997), para 61.

³⁸ 7 CFR Part 1410.

³⁹ A conservation easement is a legal agreement that is registered against title to the property, whereby the landowner agrees to permanently limit the type and amount of development on their property, while retaining ownership and certain other rights to use of the land.

⁴⁰ New York Forest Tax Law, § 480-A.

⁴¹ '480-a Forest Tax Law' (New York State Department of Environmental Conservation) <www.dec.ny.gov/lands/5236.html#management> accessed 20 March 2017.

⁴² Surface Water Treatment Rule, 40 CFR, §141.71 - §141.75.

⁴³ 'Watershed Protection - Regulatory Background' supra (n 28).

monitoring.⁴⁴ The avoidance criteria are not prescriptive about how exactly the watershed control program must be carried out (e.g., ownership of land in the watershed is not necessarily required), which allows room for PES schemes to contribute to water quality protection in compliance with the SWTR. Although these aspects of the enabling legal framework are located in federal law, the NYC scheme in particular has garnered attention internationally as a leading example of PES.⁴⁵ The NYC example is an innovative approach to compliance with the SWTR, and is one of the most ambitious incentive-based watershed stewardship programs in the United States, especially given that other urban suppliers typically own a greater portion of land in their watershed.⁴⁶

There is no overarching legal or policy guidance specifically on how PES approaches should be carried out as part of an effective watershed control program. Outside the regulatory framework, private law tools are employed in implementation of the Catskills/Delaware WAP. The Program is grounded in an umbrella partnership agreement – the New York City Watershed Memorandum of Agreement, signed in 1997 by NYC and a number of federal, state, and community partners, setting out an agreement to establish the *Long Term Watershed Protection Program*, initial funding commitments, and respective roles and responsibilities for implementation. In addition, individual funding contracts are signed with each participant in the WAP and the Watershed Forestry Program and conservation easements are used to secure long-term commitments for land protection and stewardship.

6.2.2 PES Actors, Administration and Oversight

Administration and oversight. Oversight of the WAP is provided at a high-level within the overarching regulatory framework under the SDWA, and is administered more directly through voluntary agreements and non-governmental policies established outside the regulatory framework. The SDWA and SWTR establish EPA oversight of any watershed control programs carried out to maintain filtration avoidance. In accordance with the ‘avoidance criteria’ set out under the SWTR, the EPA must be satisfied that an effective watershed control program is in place in order to issue a Filtration Avoidance Determination (FAD).⁴⁷ Under the law, the EPA may

⁴⁴ Surface Water Treatment Rule, 40 CFR §141.71 and §141.72.

⁴⁵ T Gartner and others (eds), *Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States* (World Resources Institute 2013); JE Salzman, *A Policy Maker's Guide to Designing Payments for Ecosystem Services* (Asian Development Bank, 2009); *Payments for Ecosystem Services: A Best Practice Guide* (Defra 2013).

⁴⁶ Pires *supra* (n 8).

⁴⁷ Surface Water Treatment Rule, 40 CFR §141.71 and §141.72.

delegate certain functions to other regulatory bodies, and in 2007 the EPA transferred primacy for regulatory oversight of NYC's FAD to the New York State Department of Health (NYSDOH).⁴⁸

NYC must submit detailed information on its watershed control program to the EPA and NYSDOH in support of its FAD application. This includes details on the WAP, and a copy of the MOA demonstrating agreement with partners in the watershed. Typically, FADs are issued every five years. The Catskill/Delaware portion of the NYC water supply system has met the criteria for filtration avoidance under the SWTR from 1993 to the present, and given the history of good compliance and confidence about the ongoing stability of NYC's watershed control program, the two most recent FADs were issued for ten-year periods from 2007-2017 and from 2017-2027.⁴⁹ In accordance with the SWTR criteria, the NYC FAD sets out a number of terms and conditions for maintaining filtration avoidance, including NYC DEP's ongoing administration and funding of the WAP.⁵⁰ The most recent version of the *Long Term Watershed Protection Plan* was prepared in 2016, in support of NYC's application to maintain the FAD for the period beyond 2017.⁵¹

The NYC DEP is responsible for implementing the *Long Term Watershed Protection Program*, as the water supplier bound by the terms of the FAD. Different components of the Program are carried out in partnership with a range of federal, state and community governmental and non-governmental entities. The 1997 MOA was negotiated over a period of two years and over 150 stakeholder meetings, and eventually signed by NYC, the State of New York, the EPA, 73 local municipalities and eight counties in the watersheds, and five environmental organizations. The Watershed Agricultural Council (WAC) is a not-for-profit organization specifically created to assist with implementation of the watershed protection and economic development programs agreed to in the 1997 MOA. The WAC carries out administration of the WAP and the Watershed Forestry Program, under the terms of multiple successive contracts with the NYC DEP.

Governance of the WAC, including policy making and fiscal oversight, is led by a 16-member Board of Directors representing the interests of farm and forest landowners within the NYC water supply region.⁵² The NYC DEP is a voting member on the WAC Board and directly participates in all

⁴⁸ New York City Filtration Avoidance Determination (Prepared By New York State Department of Health in consultation with United States Environmental Protection Agency, December 2017).

⁴⁹ *ibid.*

⁵⁰ *ibid.*

⁵¹ *Long-Term Watershed Protection Plan* *supra* (n 36).

⁵² 'About us' (Watershed Agricultural Council) <www.nycwatershed.org/about-us/overview/advisory-committee/> accessed 20 March 2017.

WAC program committees and project working groups. A number of committees and working groups are designated with specific functions for different aspects of the program – including, for example, selection of applicants for participation, the selection of best management practices suited to particular properties, the selection of properties eligible for easements, and monitoring of compliance with agreements. There is also a WAC Advisory Committee that provides expertise on policies and program implementation, representing County local governments, State and Federal agencies, communities business associations and environmental groups. As a non-governmental entity, the WAC is not required to comply with access to information laws and other laws requiring transparency of public officers. However, WAC policy commits to transacting business in an open and transparent manner similar to the procedures required of public bodies.⁵³

The 1997 MOA sets out specific conditions for implementation of the Watershed Agricultural Easement program, on a “willing seller/ willing buyer” basis - demonstrating particular concern for due process and transparency in cases where property rights are ceded. Before beginning to solicit acquisitions, the City must notify the chief elected official of the relevant Town and County, and if requested must make a presentation, open to the public, describing what land is eligible, the process for selecting applicants, and a map of priority areas.⁵⁴ The MOA also states that NYC and the WAC will jointly determine, among other things, the procedures and standards for appraising fair market value of proposed easements, and the appropriate terms and conditions of easements. The easements may be held by NYC jointly with WAC, or by the WAC alone, as long as the terms of the easement give NYC third party enforcement rights. In either case, the WAC has primary responsibility for administering, monitoring and enforcing the terms of the easements.⁵⁵

Beneficiaries, buyers and funding. The NYC DEP funds the *Long-Term Watershed Protection Program*, in accordance with its responsibility to implement the program under the terms of the FAD. This includes funding to WAC to cover all costs associated with the implementation of programs.⁵⁶ It is in part financed directly by beneficiaries - the nine million consumers of the NYC water supply system - through consumer’s water bills. NYC funding is also supplemented by federal and state grants, where available. Investment in watershed protection to restore natural filtration and reduce pollution represented a lower-cost option to compliance with SDWA requirements,

⁵³ Ibid.

⁵⁴ New York City Watershed Memorandum of Agreement (1997), para 60.

⁵⁵ New York City Watershed Memorandum of Agreement (1997), para 78.

⁵⁶ *Long-Term Watershed Protection Plan* supra (n 36).

compared to the cost of the alternative option to build a new filtration plant. Watershed conservation cost an estimated USD \$1 to 1.5 billion over its initial 10 years, while a new filtration plant would have cost an estimated USD \$8.0 to \$10.0 billion to construct and approximately \$1.0 million each day to operate and maintain.⁵⁷ The question of ‘voluntariness’ on the part of NYC and the water customers in funding PES is nuanced. Water customers have little direct input on the spending decisions taken on their behalf by NYC. ON the part of NYC, compliance with the SWDA is mandatory and requires spending, while the adoption of PES approaches is a choice. The WAP also leverages funding from a federally-administered grant program, established under the *Clean Water Act*, to address diffuse pollution.⁵⁸

The cumulative expenditure on incentives for best management practices under the Watershed Agricultural Program was \$USD 58 million between 1992 and 2016, which does not include planning, design and administrative expenses. The MOA also stipulated that up to USD \$10 million may be used by NYC to acquire Watershed Agricultural Easements, allocated from a total of USD \$250 million set aside for land acquisition (with the remainder going to land purchases).⁵⁹ Looking ahead, the 2016 *Long Term Watershed Management Plan* indicates that new spending priorities include over \$31 million earmarked for implementation of new best management practices to prevent and mitigate pollution.⁶⁰ The 2016 plan indicates conservation easements will be expanded on an ongoing basis, without specific funding commitments.⁶¹

Eligibility for payments. All of the programs administered by the WAC are voluntary on the part of participants. Participants are selected based on applications, in accordance with WAC policies. For the WAP, WAC requires applicants to be the owner or lessor of farmland used for an active farm operation (including livestock or crops) within the NYC Watershed boundaries. To qualify as a ‘large farm’, the gross annual sales of such products must average over \$10,000 in the two-year period preceding the application. After screening for these minimum eligibility criteria, applications are further assessed and prioritized based on pollution threats, as described in the following section 6.2.3.

⁵⁷ ‘Facts About The NYC Watershed’ supra (n 9).

⁵⁸ ‘Polluted Runoff: Nonpoint Source Pollution: 319 Grant Program for States and Territories’ (United States Environmental Protection Agency) <www.epa.gov/nps/319-grant-program-states-and-territories> accessed 20 March 2017.

⁵⁹ New York City Watershed Memorandum of Agreement (1997), para 74.

⁶⁰ *Long-Term Watershed Protection Plan* supra (n 36).

⁶¹ *ibid.*

Under the conditions of the FAD, the NYC DEP is required to maintain at least 90 percent participation of active large farms in the WAP.⁶² By 2016, the WAP had exceeded this target, with about 350 active Whole Farm Plans in place and implementation of over 7,100 BMPs.⁶³ In addition, more than 1,800 acres of land has been set aside in riparian buffers through enrollment in the federal CREP. Maintenance of whole farm plans and BMPs, in addition to recruitment of new participants, is planned for the 2017-2027 FAD period.⁶⁴

There are more specific eligibility requirements for participation in the Agricultural Conservation Easement program. The 1997 MOA states that all easements must be on farms that have first completed a Whole Farm Plan approved by WAC, and WAC policy further states that properties must generally be a minimum of 50 Acres in size, while smaller properties may be considered on a case by case basis if there are substantial water and agricultural resources on the property or if it is located in a priority area for acquisition as identified by the NYC DEP.⁶⁵ If land is leased, WAC staff must meet with the lessor directly to explain the requirements of the proposed WAC easement. A dedicated Easement Committee within WAC evaluates applications, selects participants, and negotiates easement terms and conditions.⁶⁶ As of 2016, 26,242 acres of easements had been secured by the WAC.⁶⁷

For the Watershed Forestry Program, WAC approves applications on a case-by-case basis, and the program is open to landowners of woodlots in the NYC watershed, or to loggers operating on woodlots in the watershed, as long as applications are co-signed by the landowners. In addition, any landowners of wooded areas over 50 acres may be eligible for a state woodland management programme that provides tax breaks under the New York Forest Tax Law, and WAC supports enrolment of participants within the watershed.⁶⁸

6.2.3 PES Design

Targeting ecosystem services. The design of the *Long Term Watershed Protection Program* is guided primarily by the need to comply with the SDWA and maintain filtration avoidance under

⁶² New York City Filtration Avoidance Determination supra (n 45).

⁶³ *Long Term Watershed Protection Plan* supra (n 36).

⁶⁴ *ibid.*

⁶⁵ 'Agricultural Conservation Easement Program: Applicant Selection Guideline' (Watershed Agricultural Council 2015).

⁶⁶ *ibid.*

⁶⁷ *Long-Term Watershed Protection Plan* supra (n 36).

⁶⁸ 'BMP Program' (Watershed Agricultural Council) <www.nycwatershed.org/bmp-program> accessed 25 March 2017.

the SWTR. To meet SWTR filtration avoidance criteria, a watershed control program must minimize the potential for contamination of source waters by *Giardia* bacteria and specified viruses, and reduce pollution from nitrates, phosphates and agrochemicals. Ultimately, source water must meet standards setting out maximum levels for specified constituents including coliforms, turbidity and disinfection by-products. Many of the interventions that are funded under the Watershed Agricultural Program the Watershed Agricultural Easements Program and the Watershed Forestry Program are designed to protect and restore ES that contribute to meeting these water quality standards.

Applications to participate in the Watershed Agricultural Program are prioritized in accordance with WAC guidelines setting out different categories of pollution threats, which correspond to different types of activities on the land and the location of land within the watershed. Whole Farm Plans are developed jointly by environmental experts and farm operators, in accordance with WAC guidelines, and must give specific consideration to aspects of the farm operations that relate to water quality objectives.⁶⁹ The WAC does not use ES terminology per se, but defines BMPs as “practices that prevent or reduce the availability, release or transport of substances which adversely affect surface and groundwaters. Funding for specific BMPs is prioritized based on interventions likely to achieve the greatest water quality benefit, with the establishment of riparian buffers being given the highest priority.⁷⁰

Conservation easements are enabled under state statute, including for the purposes of ‘protecting environmental assets’ and for ‘the preservation development and improvement of agricultural and forest lands’.⁷¹ WAC’s standardized easement agreement more specifically requires that properties be primarily cropland, pasture or forest “whose soils are productive and are an important natural resource... [and] also contain hydrologically active areas and other special natural features which are particularly important to the protection of the water quality of the New York City water supply”.⁷² The purpose of the easements is to “protect the water quality of the New

⁶⁹ ‘Watershed Agricultural Guidelines 2.1.01: Whole Farm Plans’ (Watershed Agricultural Council 2015).

⁷⁰ Riparian buffers are the highest priority because of significant water quality benefits, but also because cost sharing provided by USDA through CREP: ‘Watershed Agricultural Program Guideline 3.1.01: BMP Prioritization and Workload Development’ (Watershed Agricultural Council 2011).

⁷¹ New York Environmental Conservation Law, § 1-101, Art. 49, Title 3.

⁷² Deed of Conservation Easement (Watershed Agricultural Council), preamble para B <www.nycwatershed.org/wp-content/uploads/2015/10/EP_WAC_Deed_of_ConsEase.pdf> accessed 20 March 2017.

York City watersheds... by limiting the form, location and density of development and promoting good stewardship by the implementation of Whole Farm Plans”.⁷³ The easements restrict land use to only agreed-on activities and prohibit impervious surfaces and buildings outside designated areas, which generally must not exceed 5 percent of the property. More targeted interventions related to ES for water quality include the designation of areas that contain unique or special features such as streams, wetlands or slopes and supporting buffer lands, where no improvements may be built, and requiring that the portion of land within 25 feet of a watercourse not be cultivated or tilled, and that trees and shrubs along streams and waterways be maintained “so far as is practicable to assist in achieving long-term water quality standards through nutrient absorption, sedimentation control from runoff and stream channel and bank stability”.⁷⁴

WAC has established guidelines for the selection of applicants for easements, intended to target lands that will most effectively and efficiently benefit water quality and ensure that landowners are treated fairly and equitably during the selection process. Properties are ranked according to a scoring system, illustrated in the table below.

Table 6.2.3.1 - Agricultural Conservation Easement Program Applicant Selection Guideline⁷⁵

Criteria	Points
<ul style="list-style-type: none"> The presence of water resources on the property, including streams, lakes, ponds, wetlands; and Land within the 100 year floodplain boundary 	30 points for 27+ acres 15 points for 15-27 acres 5 points for under 15 acres
<ul style="list-style-type: none"> Properties located within ‘priority areas’ that influence water quality, as designated by NYC DEP maps 	5 points
<ul style="list-style-type: none"> Properties located within ‘areas of high focus’ (sub-areas within ‘priority areas’) that influence water quality, as designated by NYC DEP maps 	5 points
<ul style="list-style-type: none"> Properties located within Agricultural Conservation Corridors (properties that are immediately adjacent to other land protected under the WAP) 	15 points
<ul style="list-style-type: none"> Properties located adjacent to land protected under conservation easement 	5 points
<ul style="list-style-type: none"> Size of the land 	40 points for 300+ acres 35 points for 200-300 acres 25 points for 100-200 acres 15 points 50-100 acres

⁷³ *ibid*, para 1.

⁷⁴ *ibid*, para 3(f).

⁷⁵ ‘Agricultural Conservation Easement Program: Applicant Selection Guideline’ (Watershed Agricultural Council 2015).

The Watershed Forestry Program supports the implementation of BMPs primarily targeting erosion control. This involves interventions to encourage natural drainage and reduce erosion from trails and cleared areas - for example, installing water bars (a mound that diverts flowing water), digging culverts on trails, and spreading native grass seed. The program also supports BMPs related to minimizing impacts from stream crossings, which are the source of the majority of sediment pollution from logging (e.g. the use of temporary bridges, which are available on loan from the WAC and restoration activities to stabilize stream banks).⁷⁶

Structure of incentive and payment terms and conditions. The NYC Long Term Watershed Protection Program utilizes incentives in a number of different ways, and WAC has discretion to determine the appropriate level of funding and terms and conditions. While payment amounts and specific interventions are negotiated between WAC and each participant, these funding arrangements are subject to various policies and standardized contracts developed by WAC.⁷⁷

Under the WAP, farmers commit to Whole Farm Plans under contract. Each participant signs an agreement with the WAC, setting out standardized general provisions along with a farm-specific schedule, timeline and funding agreement for BMPs.⁷⁸ Individual farm-level contracts are not published publicly. The term of the contract varies from a few months to multiple years depending on the time needed to implement specific BMPs; when integrated with the requirements of the federal CREP, the contract period is typically 10–15 years.⁷⁹ The exact funding levels also vary, but are designed to provide reimbursement of costs rather than to cover any possible opportunity costs. The WAC guidelines provide that new Whole Farm Plans generally should not exceed a total funding threshold of USD \$300,000 for a large farm and USD \$100,000 for a small farm, and funding is provided after proof of proper implementation of BMPs (which may be carried out in stages as per the contract timeline).⁸⁰ This funding is supplemented by technical assistance and education.⁸¹ The aspect of community engagement provides an important additional non-financial incentive.⁸²

⁷⁶ BMP Program supra (n 68).

⁷⁷ 'Policies, Agendas & Minutes' (Watershed Agricultural Council) <www.nycwatershed.org/about-us/policies-agendas-minutes/> accessed 20 March 2017.

⁷⁸ WFP-1: Participation and Funding Agreement (Watershed Agricultural Council 2015).

⁷⁹ *Long-Term Watershed Protection Plan* supra (n 36).

⁸⁰ 'Watershed Agricultural Guidelines 2.1.01: Whole Farm Plans' (Watershed Agricultural Council 2015).

⁸¹ *ibid.*

⁸² Pires supra (n 8).

The Conservation Easements Program provides an added incentive, via the cash purchase of development rights and tax relief, to secure long-term land use restrictions. The MOA states that easements must be acquired at fair market value as determined by an independent appraisal ordered by the City and performed by an independent, certified New York State appraiser.⁸³ Properties under easement are also exempt from real property taxation.⁸⁴ While the process for selecting easements is consistent and transparent, the exact amounts agreed to for the purchase of easements on individual properties is not made public.

Under the Watershed Forestry Program, WAC provides money, loans of equipment, and technical support for water quality BMPs. These are agreed to via a standardized application form and contract with WAC, with fixed payment rates for each BMP, intended to cover costs.⁸⁵ BMPs can be used to support compliance with conditions under state logging permits (which, generally, do not stipulate specific BMPs, but require an operational plan to demonstrate, among other things, protection of water quality).⁸⁶ Under the New York Forest Tax Law, ten-year commitments to woodland management plans under the state program can result to up to an 80 percent reduction of taxes. The WAC Watershed Forestry Program provides a bonus incentive for enrolment of forested land within the NYC Watershed. Approved landowners may receive a one-time payment from WAC of USD \$463.50, plus \$5.67 per acre of land, while landowners that are re-enrolling may receive a one-time payment of \$309, plus \$0.52 per acre of land. This funding is intended to offset the cost of enrolling in the program, which requires hiring a licenced forester to complete a woodland management plan.⁸⁷

Monitoring and enforcement. The Filtration Avoidance Determination (FAD) issued by the EPA and NYSDOH under the SWRT includes a number of binding conditions for monitoring and enforcement of the *Long Term Watershed Protection Program*. The NYC DEP must submit a performance report to the EPA and NYSDOH each year, including details such as: the number of new and revised Whole Farm Plans in place; the number, types and dollar amounts of BMPs implemented for agriculture and forestry; the number of acres enrolled in the federal CREP, and

⁸³ New York City Watershed Memorandum of Agreement (1997), para 78.

⁸⁴ *ibid.*

⁸⁵ 'Best Management Practice Program Application' (Watershed Agricultural Council) <www.nycwatershed.org/wp-content/uploads/2015/10/BMP-Program-Application.pdf> accessed 20 March 2017.

⁸⁶ BMP Program *supra* (n 68).

⁸⁷ '480-a Enrollment Incentive' (Watershed Agricultural Program) <www.nycwatershed.org/forestry/planning/480-a-enrollment-incentive/> accessed 20 March 2017.

enrolled in woodland management plans under the New York Forest Tax Law; and, the number of new acres acquired under conservation easements, and the percentage of total land under easement, broken down by sub-basins in the watershed.⁸⁸ Ultimately, the NYC DEP must be able to demonstrate control over activities in the source watershed, and the FAD specifically provides that this may be achieved via land ownership or written agreements.⁸⁹ The FAD also requires comprehensive watershed monitoring, including daily water quality testing for reservoirs, streams, and aqueducts.⁹⁰

Under the FAD, annual status reviews must be carried out for at least 90 percent of all active Whole Farms Plans.⁹¹ WAC guidelines set out a procedure for staff to conduct status reviews, with basic reviews conducted each year, and comprehensive reviews conducted every four years.⁹² WAP contracts also stipulate that funding is not transferred until WAC staff have verified and approved the completion of BMPs, and provides a process for dispute resolution.⁹³ With respect to the Watershed Forestry Program, WAC foresters carry out inspections of each BMP project once it has been installed, prior to issuing payment. There is no long-term follow up, given the nature of the particular BMPs, which entail a one-time installation, rather than ongoing activities.⁹⁴

The 1997 MOA includes terms dealing with the enforcement of conservation easements, including requiring that NYC DEP inspect properties at least twice each year, which may include aerial inspections. The MOA also requires that the New York State Attorney General be granted full third party enforcement rights over all conservation easements in the NYC watershed.⁹⁵ These terms are built into the standardized conservation easement agreement used by WAC, which also includes a dispute resolution process which may be led by WAC before the matter goes to arbitration under the NY court system. WAC may apply to the court for an injunction to stop specific actions temporarily or permanently, where there is an imminent or immediate threat to the City's drinking water supply.⁹⁶ Properties may be sold subject to an easement, but if the easement

⁸⁸ New York City Filtration Avoidance Determination *supra* (n 45).

⁸⁹ *ibid.*

⁹⁰ *ibid.*

⁹¹ *Long-Term Watershed Protection Plan supra* (n 36).

⁹² 'Whole Farm Plan Annual Status Review Guidelines 3.1.10' (Watershed Agricultural Council 2015).

⁹³ WFP-1: Participation and Funding Agreement (Watershed Agricultural Council 2015).

⁹⁴ BMP Program *supra* (n 68).

⁹⁵ New York City Watershed Memorandum of Agreement (1997), para 83.

⁹⁶ Deed of Conservation Easement *supra* (n 72).

is terminated when the property is sold, WAC is entitled to a percent of the proceeds, to be applied to activities consistent with the purpose of the easement.⁹⁷

6.3 Enabling Framework for PES for Catchment Management in England

6.3.1 Context and Overview of Legal Framework for PES

Environmental and economic development context. England is a small and very densely populated country located within the United Kingdom (UK), along with Wales, Scotland and Northern Ireland. With an area of just over 130,00 square kilometres, England comprises about 53 percent of the UK's total area.⁹⁸ Its population was approximately 55,786,300 in 2015, accounting for 84 percent of the UK's total population.⁹⁹ This puts England among the top 25 most densely populated countries in the world.¹⁰⁰ The UK has a 'Very High' Human Development Index according to the United Nations Development Programme (ranked 16 in the world in 2015),¹⁰¹ and its GDP per capita was USD 40,412 in 2016.¹⁰² In 2015, 100 percent of the population of the United Kingdom had access to basic and safely managed drinking water services.¹⁰³

As the first industrialised country in the world, its ecosystems have been heavily modified by urban development and industrial activity going back to the 18th century.¹⁰⁴ Urbanisation occurred relatively early in the country's history and this trend continues, with 17 percent of the population living in rural areas in 2015, compared to 22 percent in 1960.¹⁰⁵ The UK undertook a national-level ecosystem assessment, taking an explicit ES-focus, published in 2011, with a follow-on report in 2014 that further considered the value of ES to different sectors of the economy.¹⁰⁶ Overall the

⁹⁷ *ibid.*

⁹⁸ 'Surface Area' (sq. km)' (The World Bank: Data)

<https://data.worldbank.org/indicator/AG.SRF.TOTL.K2?year_high_desc=true> accessed 6 May 2018.

⁹⁹ 'Population Estimates for UK, England and Wales, Scotland and Northern Ireland: mid 2015' (Office for National Statistics 2016) <www.ons.gov.uk/peoplepopulationandcommunity> accessed 7 March 2017.

¹⁰⁰ 'Population, total' (The World Bank: Data)

<https://data.worldbank.org/indicator/SP.POP.TOTL?year_high_desc=false> accessed 6 May 2018.

¹⁰¹ 'Human Development Data (1990-2015)' (United Nations Development Programme, Human Development Reports) <<http://hdr.undp.org/en/data>> accessed 6 May 2018.

¹⁰² 'GDP per capita (current US\$)' (The World Bank: Data)

<<https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>> accessed 6 May 2018.

¹⁰³ 'United Kingdom of Great Britain and Northern Ireland' (JMP WASH Data) <<https://washdata.org/data#!/gbr>> accessed 14 April 2018.

¹⁰⁴ *The UK National Ecosystem Assessment (UKNEA): Synthesis of the Key Findings* (UNEP-WCMC 2011).

¹⁰⁵ The World Bank, Data: Rural population (% of total population 1960 - 2015), accessed March 7, 2017 online at: <http://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?view=chart>

¹⁰⁶ *The UK National Ecosystem Assessment Follow On (UKNEAFO): Synthesis of the Key Findings* (UNEP-WCMC 2014).

assessment of eight broad aquatic and terrestrial habitat types found that over the previous 50 years there had been significant deterioration of habitat and biodiversity and some ecosystem services relating to water, air and soil quality, in particular due to land conversion for agriculture and over-grazing.¹⁰⁷ There had been some improvements in ES post-2000, resulting from better protection of ecosystems through law and policy, attitudes and technology, and better management of protected areas.¹⁰⁸ A high proportion of land in England is privately owned, and government studies of PES have noted that private actors must be engaged to restore ecosystem services, since the private sector owns and controls much of England's natural capital.¹⁰⁹

England's land is heavily farmed, with about 70 percent of its total area used for agriculture, comprised of 55 percent enclosed farmland, and 15 percent extensive grazing on semi-natural grasslands. While farmland has cultural significance and a crucial role in food production, it can also be managed to better support services such as biodiversity and regulation of water quality and flows. Protected areas cover about 8 percent of England. The natural cover of mountains, moorlands and heaths has been significantly decreased through conversion for grazing, and most natural grassland has been lost due to conversion to arable land, while more than 60 percent of these remaining habitats are protected.¹¹⁰ Only about 9 percent of England is wooded, making it one of the least-wooded countries in Europe, and much of it is productive plantation comprised of non-native conifer species. However, woodland management is improving, and, where favourably located, woodlands possibly deliver the greatest number of ecosystem services, including carbon storage, recreation, timber and water regulation.¹¹¹

Wetlands cover only about 4 percent of England, and about half of these now have protected status due to their high biodiversity. Overgrazing, burning, pollution and drainage are the main threats to wetlands, while eutrophication due to high concentrations of phosphates and nitrates is the main threat to open waters.¹¹² The condition of surface water bodies is declining: 20 percent of those assessed had high or good status in 2015, compared to 25 percent in 2010. Diffuse pollution is the biggest challenge to improving water quality, especially nitrates, phosphates and

¹⁰⁷ UKNEA supra (n 104).

¹⁰⁸ UKNEAFO supra (n 106).

¹⁰⁹ Natural Capital Committee, *Improving Natural Capital: An Assessment of Progress, Fourth report to the Economic Affairs Committee* (February 2017).

¹¹⁰ UKNEA supra (n 104).

¹¹¹ UKNEAFO supra (n 106); *England Natural Environment Indicators* (Defra, August 2016).

¹¹² UKNEA supra (n 104).

sediments, with agriculture being the lead contributor.¹¹³ About one third of tap water in England comes from groundwater aquifers, while the rest comes from reservoirs, lakes, and rivers.¹¹⁴ While England has relatively abundant water resources, its high population creates localised pressure on water service provision, and periods of drought are expected to increase due to climate change. Flooding is an increasingly significant challenge in parts of England, caused in part by the alteration of wetlands and floodplains, and is being exacerbated by climate change.¹¹⁵

Legal and institutional context The United Kingdom is a sovereign state comprising four nations: England, Wales, Scotland, and Northern Ireland. England is governed by the English common law legal system. The UK is a parliamentary democracy, with separation of legislative, executive and judicial functions, and a hereditary Monarchy as Head of State. Parliament is responsible for making statutory law.¹¹⁶ The constitution of the UK has evolved through convention, statutes and the common law, but there is no consolidated written constitution. The UK Parliament recently consulted on a draft codification of the constitution, which set out a purpose statement in the preamble, including: “to preserve our common environment and to hold it in trust for future generations”.¹¹⁷ The UK has been a member of the European Union (EU) since 1973, but began the process to withdraw from the EU following a referendum in June 2016. A significant body of EU law exists in relation to the environment and water resource management, which remains relevant at the time of writing.¹¹⁸

The EU Water Framework Directive (WFD)¹¹⁹ mandates member states to carry out river basin planning and includes measures for pollution reduction, sustainable water use and flood and drought mitigation, based on an Integrated Water Resource Management approach. It requires the identification and protection of drinking water sources (above a certain size), to support compliance

¹¹³ *England Natural Environment Indicators* supra (n 111).

¹¹⁴ ‘Tap water FAQs’ (Water UK) <<https://www.water.org.uk/consumers/water-and-health/faqs#come%20from?>> accessed 5 May 2018.

¹¹⁵ UKNEA supra (n 104).

¹¹⁶ The Parliament of the UK exercises jurisdiction in England, while devolved parliaments in Scotland, Northern Ireland, and to a lesser extent, Wales, have jurisdiction over certain matters in those countries. See, respectively: *Scotland Act 1998*, c.46; *Northern Ireland Act 1998*, c. 47; *Government of Wales Act 1998*, c.38.

¹¹⁷ Political and Constitutional Reform Committee, *The UK Constitution: A Summary, With Options for Reform* (London: House of Commons, March 2015).

¹¹⁸ To provide legal certainty over the exit from the EU, the government has proposed a bill to convert EU law into domestic law, with the view that Parliament will later decide which elements of that law to keep, amend, or repeal: European Union (Withdrawal) Bill, HC Bill 5 2017-19.

¹¹⁹ Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (WFD).

with the EU Drinking Water Directive,¹²⁰ which sets quality standards for drinking water.¹²¹ While the term ‘ecosystem services’ is not used, the ES concept is reflected in the purpose of the WFD to “prevent further deterioration and protect and enhance the status of aquatic ecosystems”¹²² and its objective to achieve “good ecological status” for all water bodies, which is defined as: “an expression of the quality of the structure and functioning of aquatic ecosystems associated with surface waters.”¹²³ The WFD recognizes the economic value of water, but also that “water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such”.¹²⁴ The EU’s Common Agricultural Policy (CAP)¹²⁵ has also had an important influence on land and water management in England, and implements a system of agricultural subsidies and rural development programs. As noted in the discussion below, there may be opportunities to coordinate PES for catchment management with existing agri-environmental schemes such as CAP. However, the CAP scheme itself is beyond the scope of this thesis.

The Department for Environment, Food and Rural Affairs (Defra) is the UK ministerial department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities. In England, the Environment Agency is a non-ministerial public body designated with broad responsibilities for regulating and managing the environment, under the key environmental protection statute, the *Environment Act 1995*.¹²⁶ This includes setting regulatory standards and administering programs for water quality and pollution control, water resources management, flood control, conservation and industry regulation.¹²⁷ The Environment Agency manages the seven River Basin Districts in England, and prepares River Basin Management Plans in accordance with guidance issued by Defra and in fulfillment of WFD requirements.¹²⁸ Defra

¹²⁰ Council Directive 80/778/EEC of 15 July 1980 on the quality of water intended for human consumption.

¹²¹ WFD supra (n 119), Art.7.

¹²² WFD supra (n 119), Art.1.

¹²³ WFD supra (n 119), Art. 2.21.

¹²⁴ WFD supra (n 119), Preamble, Art.1

¹²⁵ ‘Agriculture and Rural Development: CAP at a glance’ (European Commission) <https://ec.europa.eu/agriculture/cap-overview_en> accessed 2 November 2017.

¹²⁶ Environment Act 1995, c. 25, s. 1; The Environment Agency is funded by a combination of grants from Defra and charging schemes designed to recover the costs of administering environmental programs, see: Environment Agency, *Annual report and accounts for the financial year 2015 to 2016* (Environment Agency 2016).

¹²⁷ *Environment Act 1995*, c. 25, ss. 5 and 6.

¹²⁸ *River Basin Planning Guidance* (Defra, July 2014).

policy also supports a catchment-based approach to water management.¹²⁹ Partnerships for catchment planning have been established in all of the 87 catchments in England that are under Environment Agency jurisdiction. However, these partnerships and catchment plans have no statutory status or formal part of the statutory basin planning process.¹³⁰

Water and sewerage services are delivered by 32 private companies following divestment of the industry in England and Wales in 1989. The *Water Industry Act* sets out the statutory duties of companies to develop and maintain water supply and sewerage systems and establishes the Water Services Regulation Authority (Ofwat) as a non-ministerial body charged with economic regulation of water companies.¹³¹ Under the Act, Ofwat has discretion to set rules to protect consumer interests, ensure proper financial management of companies, and secure the long-term resilience of water and wastewater systems.¹³² Defra is required to develop strategic policy statements to guide Ofwat.¹³³ This guidance provides transparency regarding government priorities and desired outcomes and aims to ensure the regulatory framework is consistent with broader government policy.¹³⁴

The UK is a global leader in developing policies and institutions to support an ecosystem services approach. It was the first in the world to undertake a national-level ecosystem assessment, following the ecosystem services framework as in the UN MEA.¹³⁵ The UK government's 2011 *Natural Environment White Paper* (published under the 2010 to 2015 Conservative and Liberal Democrat coalition government) set out a number of commitments to advance an ecosystem services approach, including PES, in government and the private sector.¹³⁶ Following a key commitment in the White Paper, in 2012 an independent Natural Capital Committee (NCC) was established to report to Cabinet on the state of England's natural assets, and to provide advice to

¹²⁹ *Catchment Based Approach: Improving the Quality of Our Water Environment, A policy framework to encourage the wider adoption of an integrated Catchment Based Approach to improving the quality of our environment* (Defra, May 2013).

¹³⁰ *Ibid.*

¹³¹ *Water Industry Act 1991*, c.56, s. 37 and s. 2.

¹³² *Ibid.*, s. 2.

¹³³ *Water Industry Act 1991*, c. 56, s. 2A, 27(3) and 192B(2)(e).

¹³⁴ *Defra's Strategic Policy Statement to Ofwat: Incorporating Social and Environmental Guidance* (Defra 2013), 1.

¹³⁵ UKNEA *supra* (n 104).

¹³⁶ Defra, *Natural Environment White Paper: The Natural Choice - Securing the Value of Nature* (HM Government, June 2011).

the government on the sustainable use of natural capital. The NCC was continued in 2015 under the successive Conservative government, while the enthusiasm for PES appears diminished.¹³⁷

Overview of the legal framework for payments for ecosystem services. PES in England remains in relatively early stages, and is characterised mainly by ad hoc, grassroots initiatives. Government policy has been explicitly supportive of ES-based approaches and PES, but there is no statutory law or regulation that specifically addresses PES. Defra supported 16 pilot projects between 2012 and 2015 to build capacity for PES and test the concept, including catchment schemes for water quality, wastewater treatment and flood reduction, and others for carbon sequestration, biodiversity and recreational services.¹³⁸ Aspects of the legal framework have been important in enabling PES in the case of catchment management, and policy encourages water companies to engage in PES, while there is no prototype agreement or coordination between individual schemes. There is one leading example: the “Upstream Thinking Project”,¹³⁹ a PES scheme for catchment management led by the water company South West Water and the environmental charity Westcountry Rivers Trust, since 2009. Other PES examples initiated by water companies are also emerging.¹⁴⁰ The analysis below will focus on the legal framework for water companies to participate in PES, drawing on some specific examples including Upstream Thinking and the Defra pilots.

At a high level, the WFD indirectly encourages PES as part of IWRM. The need to meet challenging WFD water quality targets has been identified as the main driver for the use of PES, which is proposed as a cost-effective solution in the context of an estimated £30–100 billion that will be required to comply with the Directive.¹⁴¹ Furthermore, while the WFD does not refer to PES per se, it explicitly encourages the use of economic instruments as part of programmes of measures.¹⁴² The ‘results-based’ structure of the WFD has been instrumental in enabling PES: while resulting quality standards for water bodies and drinking water are mandatory, the Directives are not prescriptive in how standards are achieved.¹⁴³ Similarly, England’s approach to implementation of drinking water quality standards has focussed on the results, or ‘outcomes’ that must be

¹³⁷ Natural Capital Committee supra (n 109).

¹³⁸ *Defra’s Payments for Ecosystem Services Pilot Projects 2012-15 Review of key findings* (Defra, December 2016).

¹³⁹ ‘Upstream Thinking’ <<http://www.upstreamthinking.org/index.cfm?articleid=8908>> accessed 1 May 2018.

¹⁴⁰ SCaMP 1 & 2 (United Utilities) <<http://corporate.unitedutilities.com/cr-scamp.aspx>> accessed 1 May 2018.

¹⁴¹ Natural Environment White Paper supra (n 136).

¹⁴² WFD supra (n 119), Preamble, Art. 38.

¹⁴³ WFD supra (n 119), Arts. 7.2 and 7.3.

achieved by water companies, without prescribing how outcomes are met. This flexibility allows PES to be part of measures towards compliance.

The *Natural Environment White Paper* was the starting point for policy supporting PES in the UK, setting a commitment to develop a plan to ‘expand markets and schemes in which payments are made by the beneficiary of a natural service to the provider of that service’.¹⁴⁴ In response, Defra launched the PES pilots and produced a number of guidance documents, including a *Best Practice Guide* for PES design,¹⁴⁵ an *Action Plan* for scaling up PES¹⁴⁶ and a summary report based on pilot experiences.¹⁴⁷ In its *Strategic Policy Statement to Ofwat* in 2013, Defra formally directed Ofwat to ensure that the regulatory framework for water and sewerage companies enables PES.¹⁴⁸ As a result, certain regulatory barriers were removed to better facilitate PES (most notably, through changes to Ofwats Price Review, described below). There is no regime in place to specifically regulate water companies’ participation in PES. While the government has encouraged PES through policy and programmes, there has not been any legislative intervention to regulate how or by whom PES is carried out. Matters such as the selection of payment recipients, the design of land management interventions to support ecosystem services, and the terms of the PES contract depend on private negotiations.

6.3.2 PES Actors, Administration and Oversight

Administration and oversight. The *Natural Environment White Paper* and other direction from Parliament give Defra a clear mandate to support and encourage PES.¹⁴⁹ However, there is no government body designated with a coordinating role or legal duty to oversee PES. Defra’s *Action Plan* for PES recognizes that the “Government and its agencies have a role in facilitating stakeholders including the private sector to develop PES”,¹⁵⁰ with the objective of encouraging a coherent approach to both publicly and privately funded PES. A relatively low level of government intervention is envisioned to achieve this, via: capacity building; disseminating best practices; demonstrating ‘proof of concept’ for PES applications through piloting; and removing barriers that

¹⁴⁴ Natural Environment White Paper supra (n 136).

¹⁴⁵ *Payments for Ecosystem Services: A Best Practice Guide* (Defra 2013).

¹⁴⁶ *Developing the potential for Payments for Ecosystem Services: an Action Plan* (Defra 2013).

¹⁴⁷ Defra Pilot Review supra (n 138).

¹⁴⁸ Defra’s Strategic Policy Statement to Ofwat supra (n 134).

¹⁴⁹ Natural Environment White Paper supra (n 136).

¹⁵⁰ Action Plan supra (n 146), 13.

could enable PES opportunities to develop.¹⁵¹ Defra’s support for PES pilots and *Best Practices Guide* for PES, issued in 2013, aimed to build capacity for a wide range of actors to participate in PES. The pilots were not designed or led by Defra, but by project proponents, and one of the project selection criteria was the extent to which projects could be self-sustaining, both administratively and financially, without government support.

Defra’s *Action Plan* for PES states that it will ensure PES approaches relating to water are integrated within a coherent framework for catchment management across England.¹⁵² However, there is thus far no mechanism for formal integration of PES, catchment management and basin planning. The *River Basin Planning Guidance* issued by Defra to the Environment Agency¹⁵³ encourages the use of non-regulatory measures such as PES where appropriate to meet WFD objectives. The Environment Agency provides some oversight and coordination, to the extent that it is responsible for consolidating a ‘Programme of Measures’ to demonstrate compliance with the WFD. The Guidance notes that “many of the measures which could be included in the programme will be ones for which [the Environment Agency is] neither the regulator nor the deliverer.”¹⁵⁴

Defra also issued the *Strategic Policy Statement to Ofwat* in 2013, noting the benefits of investments to reduce pollution upstream (by means such as PES), rather than extracting pollution downstream. It directs Ofwat to actively encourage water companies to “consider catchment schemes ... wherever this is the most economically viable approach”¹⁵⁵ and to ensure that the regulatory framework presents no barriers to water companies contributing to PES, including working with stakeholders and funding partners for such projects.¹⁵⁶ Ofwat provides some oversight with respect to water companies’ spending on PES, to the extent that it oversees water companies’ spending generally within its role as the economic regulator.¹⁵⁷ Companies must submit their business plans to Ofwat every five years as part of a regulatory process that sets limits on water and sewerage charges (the ‘Price Review’). However, these plans are very high level in their description of investments in catchment management, and Ofwat does not provide scrutiny on any of the details of the PES scheme. The Natural Capital Committee has recommended that Ofwat take

¹⁵¹ *ibid.*

¹⁵² *Action Plan* supra (n 146), 7.

¹⁵³ *River Basin Planning Guidance* (Defra, July 2014).

¹⁵⁴ *ibid.*, para 14.15.

¹⁵⁵ *Defra’s Strategic Policy Statement to Ofwat* supra (n 134), s. 3.4.4

¹⁵⁶ *Defra’s Strategic Policy Statement to Ofwat* supra (n 134), s. 3.4.3.

¹⁵⁷ In line with the powers set out in section 27(3) of the *Water Industry Act 1991*, c.56.

further measures to encourage natural capital catchment based approaches in the next review in 2019.¹⁵⁸

The Defra pilot experiences revealed that a common challenge to launching PES is the need for collective action where multiple players are involved, in the absence of clear institutional arrangements or formal coordination with other planning processes. The pilots also demonstrated that a variety of organisations can act as intermediaries with a coordinating and administrative function, including local authorities, businesses and NGOs.¹⁵⁹ In the case of Upstream Thinking, South West Water provides leadership in terms of willingness to pay for PES, and oversight of the scheme through the approval of expenditures. South West Water partnered with the environmental charity Westcountry Rivers Trust, which acts as an intermediary in fulfilling critical administrative functions for the scheme, including building relationships with farmers in the catchments and negotiating the terms of agreements.¹⁶⁰

ES-users, buyers and funding. PES schemes in England are currently funded by a variety of interested parties on a voluntary, ad-hoc basis. There is no legally secured funding stream dedicated to PES from either public or private sources. For example, there is no specific tax or user charge that is required to be directed towards PES. Defra's *Best Practices Guide* notes that potential PES buyers in UK context could include: i) private organizations and individuals who benefit directly from improved ecosystem services provision; ii) secondary buyers who buy improved ecosystem service provision on behalf of sections of the general public (water utilities are in this category); and, iii) tertiary buyers who purchase improved ecosystem service provision on behalf of the public at large (generally governments).¹⁶¹

Defra has provided funding for PES pilots, spending a total of £418,000 on the 16 pilot projects between 2011 and 2015. However, this represented mainly research and development spending, and most funds went towards planning and reporting on projects, rather than towards the incentive payment itself. The intention of the PES pilots was not for Defra to act as a 'buyer' of ecosystem services on behalf of the public, but rather to enable PES start-up and engage ecosystem

¹⁵⁸ Natural Capital Committee supra (n 109).

¹⁵⁹ Defra Pilot Review supra (n 138).

¹⁶⁰ 'Upstream Thinking – Frequently Asked Questions' (Westcountry Rivers Trust) <<http://wrt.org.uk/wp-content/uploads/2017/03/UST-FAQs.pdf>> accessed 1 May 2018.

¹⁶¹ Best Practice Guide supra (n 145).

service beneficiaries who could fund PES longer-term.¹⁶² This is consistent with Defra’s policy approach as described in the PES *Action Plan*: to fund research on “sustainable financing models for catchment-based approaches... and encourage a wide range of beneficiaries to participate to finance water quality and wider environmental enhancement.”¹⁶³ On average, the Defra pilots secured around 50 percent co-funding from partners, including water companies, businesses and NGOs.¹⁶⁴

Defra’s pilot studies demonstrated that, in the absence of a dedicated funding source, one of the biggest challenges in establishing PES schemes was the willingness of buyers to pay for ecosystem services. There was reluctance from any one beneficiary to commit to payments without assurance that other beneficiaries would also pay their ‘fair share’. There was also a perception that where ecosystem services such as water quality and flood protection benefit the public at large, their protection should be funded publicly. The pilots indicated that water companies have so far been the most willing and active private sector PES buyers. There was some success in pooling funds from multiple parties, which alleviated concerns about fairness to some extent, including: local authorities, developers, community associations, consumers, recreational visitors, local businesses (such as tourism operators), hydro-electricity, water and wastewater companies, and corporations with corporate social responsibility objectives. One pilot study explored the option of combining private funds for PES with public funds for agri-environmental schemes, but found there was no mechanism in place to enable co-ordination. The report noted that links between PES and public schemes are currently very ad hoc with multiple barriers to integration.¹⁶⁵

In the case of Upstream Thinking, between 2008 and 2015 South West Water invested £1.2 million in the programme, with plans to invest £11.8 million over the next five years from 2015 to 2020.¹⁶⁶ In 2009, Ofwat’s approval of South West Water’s business plan represented an innovative

¹⁶² Defra Pilot Review supra (n 138).

¹⁶³ Action Plan supra (n 146).

¹⁶⁴ Defra Pilot Review supra (n 138).

¹⁶⁵ *ibid.*

¹⁶⁶ ‘Upstream Thinking 2’ (Westcountry Rivers Trust) <<http://wrt.org.uk/project/ust2/>> accessed 1 May 2018.

departure from previous business plan assessments, being the first time Ofwat allowed capital investment by a water company on third-party land.¹⁶⁷

Changes in Ofwat's assessment of water companies' business plans, through the Price Review process, have resulted in greater flexibility for companies to utilize PES for catchment management to meet water service objectives.¹⁶⁸ Early Ofwat policy on PES (leading up to 2014 Price Review) demonstrated concern for the polluter pays principle, recognizing that where pollution derives from particular agricultural or other practices, the sector concerned should be primarily responsible for preventing or removing it. At the same time, it was understood that policy-makers and regulators may use incentives, along with regulation and enforcement, to encourage sectors to improve practices. Balancing these considerations, Ofwat concluded that water customers could legitimately be expected to pay for those elements of catchment management that bring direct and measurable benefits to them under the principle of PES. Ofwat suggested this may be combined with alternative funding sources so that water customers do not solely bear the costs for catchment management practices that result in wider benefits.¹⁶⁹

In the 2014 Price Review, another specific change of importance to PES was related to the way Ofwat assesses companies' capital expenditures (long-term investment) and operational expenditures (day-to-day running costs). These had previously been assessed separately, which rewarded capital expenditure (such as investment in hard infrastructure) to a greater extent than operational expenditure (such as PES and other ongoing spending on catchment management). The rules were changed for the 2014 Price Review in order to provide for assessment of capital and operational expenditures together in a single pot (called 'totex' assessments). This change provided companies with greater flexibility on spending and their ability to recover costs from customers on a variety of schemes (which may include PES), and aimed to foster innovation in how companies meet their objectives.¹⁷⁰ The 2014 Price Review showed an increase in spending on catchment management by water companies, and the 2015 Business Plan proposals contain some 300 catchment schemes. However, an external review of company business plans found the total

¹⁶⁷ Smith, L 'United Kingdom case study - Payments for ecosystem services (PES) and collective action - Upstream Thinking in the South West of England' in OECD (ed) *Providing Agri-environmental Public Goods through Collective Action* (OECD Publishing 2013).

¹⁶⁸ *Setting Price Controls for 2015-20: Overview* (Ofwat, December 2014).

¹⁶⁹ *From Catchment to Customer: Can Upstream Catchment Management Deliver a Better Deal for Water Customers and the Environment* (Ofwat, September 2011).

¹⁷⁰ Ofwat supra (n 168).

spending on catchment management is still only estimated to be around one percent of total expenditure, and it is not transparent how many of these schemes entail PES.¹⁷¹

Eligibility for payments. There is no legal or policy guidance on what constitutes eligibility to receive payments for ecosystem services. Defra's PES *Best Practices Guide* lists some examples of landowners and resource managers who are potential ecosystem service 'sellers' in the English context: farmers, agribusinesses, institutional landowners (such as Crown Estate, Forestry Commission, Ministry of Defence, the National Trust, local authorities and utility companies), large estates, woodland owners, pension funds, and environmental organisations (such as Wildlife Trusts and Woodland Trusts).¹⁷²

Land ownership in England is complex, and it may require some effort to identify the land managers or landowners who are in a position to influence ecosystem services. A government Land Registry has been in place in England and Wales since 1862, but registration is only mandatory when buying, selling or taking out a mortgage on land. Some gaps in the Registry remain, with current coverage of about 84 percent of total land area.¹⁷³ It is not uncommon, especially in rural areas, for multiple parties to have property rights affecting ecosystem services, including landowners, tenants and holders of covenants or easements over land. Within a catchment, tenant farmers may manage land that is leased from landlords, and certain conditions in the lease may restrict land uses. A landlord may need to give consent for a tenant farmer to participate in PES, and may seek to negotiate a share of the payment.¹⁷⁴

In the case of Upstream Thinking, participants were selected based on the strategic location of farms within the catchments feeding South West Water's water supply. Between 2008 and 2015, 162 farm plans had been implemented, covering 22,848 hectares of land.¹⁷⁵ There are no legal obligations on companies to report to government or make public any criteria that determined whether particular parties were engaged in PES.

¹⁷¹ *Discussion paper on the potential for catchment services in England* (Indepen 2014).

¹⁷² Best Practice Guide supra (n 145).

¹⁷³ 'About Us' (HM Land Registry) < <https://www.gov.uk/government/organisations/land-registry/about> > accessed 2 March 2017.

¹⁷⁴ Best Practice Guide supra (n 145).

¹⁷⁵ 'Upstream Thinking 2' supra (n 166).

6.3.3 PES Design

Targeting ecosystem services. Water-focussed PES schemes in England have mainly targeted ecosystem services that are affected by agricultural practices and improvements on agricultural land. Defra's *Action Plan* notes that catchment-based PES in the water sector offers the most immediately promising opportunities for PES because of the relatively direct and well understood links between upstream land management, raw water quality, and the costs of treatment to meet drinking water standards.¹⁷⁶ There is a direct link between the WFD water quality targets and the targeting of PES – i.e., the WFD creates a driver to invest in protecting ecosystems to improve water quality, to the extent needed to meet compliance standards. The extent to which site-specific data is used in designing PES, and the methods which are used, varies on a case-by-case basis. There is no law or policy guidance respecting the assessment and targeting of ecosystem services on the level of individual schemes.

In the case of Upstream Thinking, 'farm advisers' are contracted (funded by South West Water) to carry out farm-level assessments and develop management plans. The focus is on the reduction of nutrients, sediments and pesticides, with a priority on areas above abstraction points (while no specific criteria or process for prioritisation is publicly available). Specific interventions include vegetation buffers, improvements to slurry storage, fencing to keep livestock out of rivers, providing alternative water sources for livestock, and better pesticide management, including investment in new equipment. The restoration of peatland on private land to retain water was also part of Upstream Thinking, and was targeted to benefit the water treatment works supplying the majority of the company's water supply. Westcountry Rivers Trust notes that while improved quality of drinking water sources is the target, Upstream Thinking benefits river water quality generally and provides benefits to wildlife. In the next phase of the programme, there are plans to study the extent of the benefits biodiversity.¹⁷⁷

Structure of incentive and payment terms and conditions. There is no legal or policy guidance in England on matters such as the appropriate amount of a PES incentive, the length of term for a PES agreement, or standard conditions that must be satisfied by the payment recipient. The terms and conditions that are tied to a PES incentive vary on a case-by-case basis, subject to negotiation between the parties. These would typically be set out in a private contract not

¹⁷⁶ Action Plan supra (n 146).

¹⁷⁷ 'Upstream Thinking 2' supra (n 166).

accessible to the public. There is also no legal requirement for transparency regarding the terms of a PES agreement, whether or not the agreement involves a public agency or a regulated entity such as a water company.

In the absence of guidance on these matters, it is especially important that the background environmental protection regime be clear and well enforced, in order to avoid undermining the polluter pays principle and to ensure that incentives are paid for actions that are above and beyond regulatory environmental protection requirements (the condition of 'additionality'). The Defra pilot studies revealed a particular concern in the English context that PES should not reward polluting sectors. Defra's *PES Action Plan* also notes that whereas typical agri-environmental schemes have styled farmers as 'customers' applying for public funds, PES marks a shift in principle, to emphasize the role of farmers as a 'supplier' of ecosystem services.¹⁷⁸ This implies an onus on farmers to demonstrate delivery of ecosystem services and to provide justification for payments.

Another issue considered in the Defra pilots was whether the PES should have an input (action) -based or outcome-based design. An outcome-based design would make payments conditional on the actual results of an action taken by payment recipients, such as measurable levels of water quality improvement. While this was seen to have clear advantages on the buyers side, the pilot experiences highlighted the impracticality of the level of monitoring that would be required to link results to specific actions taken at the farm level, for example. In most cases, payments were made conditional on actions. The PES pilots involved long-term contracts varying from 10 to 25 years. In at least one case, agricultural market volatility made farmers unwilling to take on the risk of a long-term contract, while in other cases the prospect of stable long-term payments was considered attractive in the context of the farm business.¹⁷⁹ One of the PES pilots successfully experimented with a reverse auction in to select participants and determine payment amounts, while in other cases this was the result of negotiations among intermediaries, beneficiaries and providers.¹⁸⁰

In the case of Upstream Thinking, the programme specifically does not fund any work that constitutes a statutory legal requirement, in order to ensure that the benefits provided are over and above what would otherwise be required from farms. Grants are normally provided to cover

¹⁷⁸ Action Plan supra (n 146).

¹⁷⁹ Defra Pilot Review (n 138).

¹⁸⁰ Defra Pilot Review (2016).

fifty percent of the cost of interventions, recognising there is also value added for the farms. Grants are made on a case-by-case basis, on the recommendation of the farm advisor and Westcountry Rivers Trust, and on approval by South West Water, on the basis that they provide good value for money towards meeting water quality outcomes. Westcountry Rivers Trust also encourages participation by assuring participants confidentiality, and that any information gathered during farm visits will not be shared with regulatory authorities.¹⁸¹

Monitoring and enforcement. There is no legal or policy guidance in England on how the effectiveness of a PES scheme should be monitored, or how compliance with the terms of a PES agreement should be monitored and enforced, whether or not the agreement involves a public agency or a regulated entity such as a water company. In the case of Upstream Thinking, Westcountry Rivers Trust carries out a monitoring regime including regular water quality sampling of sampling catchments. One of the Defra pilot studies produced an outline of a model contract that could be used between an intermediary and an ecosystem service provider. They recommended including enforcement provisions such as:

- Remedies for non-performance by the provider (e.g. suspension or repayment of funding).
- Provisions setting out the circumstances in which the contract would come to an end.
- Obligations on the provider to allow the intermediary (or its nominated representative) to access the provider's land to monitor the delivery of the interventions and to gather data for the purposes of assessing the achievement of benefits.
- Provisions to enable the renegotiation and review of the interventions over time to reflect different ways of achieving the desired benefits and potential changes of use in the land.

One challenge to long-term PES in the English context has been the absence of a legal mechanism to enforce land management obligations in the event of changes in land ownership. If the ecosystem service provider disposes of land during the term of the PES scheme, under current law it is not possible to oblige a new landowner to abide by any restrictions on the use of land or to continue any land management interventions resulting from the PES agreement with the previous landowner. Such obligations cannot be achieved under contract law, which is limited by the basic tenet that a contract cannot bind those who are not party to the agreement, and while certain statutory covenants are available under English law, they are not well suited to conservation

¹⁸¹ Upstream Thinking – Frequently Asked Questions’ supra (n 160).

purposes. In 2016, the Secretary of State for Environment, Food and Rural Affairs committed to explore the possibility of legal reforms to enable statutory conservation covenants, and the role these could play in supporting Defra’s anticipated 25-Year Environment Plan.¹⁸²

6.4 Enabling PES for Source Water Protection in Ontario, Canada

6.4.1 Context and Overview of Legal Framework for PES

Environmental and economic development context. Canada is the world’s second largest country by surface area, covering over 9.9 million square kilometres,¹⁸³ with a population of just over 36.7 million in 2017.¹⁸⁴ While the population is low relative to the country’s total area, it is highly concentrated: two thirds of people live in about four percent of the country, located within 100 kilometres of Canada’s southern border with the United States.¹⁸⁵ Canada has a Very High Human Development Index ranking (ranked 10th in the world in 2015 by the United Nations Development Programme),¹⁸⁶ and a GDP per capita of USD 42,348 in 2016.¹⁸⁷ Across Canada, 98.9 percent of the population had access to basic drinking water services in 2015, which was down from 99.9 percent in 2000.¹⁸⁸ Notably, there are persistent water quality issues and gaps in standards for drinking water quality and service provision on First Nation reserve lands.¹⁸⁹ Among Canada’s ten provinces and three northern territories, the province of Ontario is, by a large margin, the most populous with 14 million people, representing over 38 percent of the country’s total population.¹⁹⁰

¹⁸² ‘Conservation covenants’ (Law Commission) <<http://www.lawcom.gov.uk/project/conservation-covenants/>>

¹⁸³ ‘Surface Area (sq. km)’ (The World Bank: Data)

<https://data.worldbank.org/indicator/AG.SRF.TOTL.K2?year_high_desc=true> accessed 6 May 2018.

¹⁸⁴ ‘Population by year, by province and territory’ (Statistics Canada) <<http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm>> accessed 9 May 2018.

¹⁸⁵ ‘Population size and growth in Canada: Key results from the 2016 Census’ (Statistics Canada: the Daily) <<http://www.statcan.gc.ca/daily-quotidien/170208/dq170208a-eng.htm>> accessed 18 May, 2018.

¹⁸⁶ ‘Human Development Data (1990-2015)’ (United Nations Development Programme, Human Development Reports) <<http://hdr.undp.org/en/data>> accessed 6 May 2018.

¹⁸⁷ ‘GDP per capita (current US\$)’ (The World Bank: Data)

<<https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>> accessed 6 May 2018.

¹⁸⁸ ‘Canada’ (JMP WASH Data) <<https://washdata.org/data#!/can>> accessed 14 April 2018. Note JMP data on the criteria of ‘safe management’ of drinking water services is not available for Canada.

¹⁸⁹ As discussed in the section below, provinces have a lead role in water resources management and oversight of drinking water service provision in Canada. However, under Canada’s constitution, the federal government has jurisdiction over First Nation reserve lands and provincial regimes generally do not apply on these lands. Many First Nations communities lack essential infrastructure and capacity for water service provision; as of May 2018 there were 76 long-term boil water advisories (in effect for over 12 months) among Canada’s 634 First Nations communities, which was down from 105 in 2016. See: ‘Water in First Nation Communities’ (Government of Canada) <<https://www.sac-isc.gc.ca/eng/1100100034879/1521124927588>> accessed 18 May 2018.

¹⁹⁰ Statistics Canada supra (n 184).

Ontario is located in east-central Canada and borders on four of the five Great Lakes, shared with the United States (Lakes Superior, Huron, Erie and Ontario). The Great Lakes region is the most populated and industrialised in Canada. In particular, an area at the western end of Lake Ontario known as the 'Golden Horseshoe' encompasses over half of Ontario's total population, including Canada's largest city, Toronto, and other metropolitan areas, as well as a hub of manufacturing and processing facilities.¹⁹¹ Including Canadian and American populations on either side of the lakes, over fifty million people live in the Great Lakes region. Challenges encountered around the Great Lakes brought many contemporary environmental problems to the forefront of policy in North America, including issues of diffuse pollution from forest management and agriculture, acid rain, long-range transport of airborne pollutants, persistent toxicity and invasive species.¹⁹² Ninety-eight percent of Ontario's total population lives within the wider Great Lakes-St. Lawrence Basin, which includes sub-watersheds covering a large portion of Ontario's southern geography, including the Great Lakes, their connecting rivers, the Ottawa River, and the St. Lawrence River, which flows to the province of Quebec and eventually to the Atlantic ocean.¹⁹³

The Great Lakes supply drinking water to over 80 percent of Ontario's population, with the remainder of the population drawing from other lakes, rivers and groundwater aquifers.¹⁹⁴ A number of pressures are disrupting the Great Lakes ecosystems and posing risks to water quality and quantity. Coastal wetlands around the Great Lakes have been largely degraded or drained for conversion to agricultural land or urban development, but remaining areas are particularly important ecosystems that provide biodiversity habitat, help reduce flooding and erosion, and help improve water quality.¹⁹⁵ While there has not been a comprehensive assessment of ecosystem services in the Great Lakes, the provincial government commissioned a study in 2010 that applied valuation methods based on ES to demonstrate economic returns on investments in protecting and restoring Great Lakes ecosystems. This study found a benefit-cost ratio for wetland protection

¹⁹¹ *ibid*: Statistics Canada defines 'metropolitan area' as areas with a population of over 100,000, of which at least 50,000 live in the urban core.

¹⁹² See J Benidickson, *Environmental Law* (Irwin Law Inc 2013) 74.

¹⁹³ Ontario's Great Lakes Strategy (Government of Ontario) <<https://www.ontario.ca/page/ontarios-great-lakes-strategy>> accessed 18 May 2018.

¹⁹⁴ *ibid*.

¹⁹⁵ *ibid*.

ranging from 13:1 to 35:1 and a benefit-cost ratio for stream restoration ranging from 2:1 to 8:1 (depending on the region).¹⁹⁶

Climate change is causing more extreme weather around the Great Lakes, and changing freeze-thaw cycles; in particular, hotter summers and reduced ice cover during winter can lead to increased evaporation from the lakes. While water supply is abundant overall, water levels are a concern on parts of the Great Lakes,¹⁹⁷ and over-abstraction of groundwater is an increasing issue in some areas.¹⁹⁸ The Great Lakes are replenished very slowly, at a rate of about 1 percent per year,¹⁹⁹ meaning that pollution of the lakes accumulates and withdrawals from the lakes are not readily renewable.

Pollutants from urban, industrial and agricultural sources are a concern. This includes rising levels of phosphorus, which is contributing to potentially toxic blue-green algae blooms in some areas. A number of invasive species are also disrupting food chains and levels of nutrients and vegetation. In particular, invasive zebra mussels exacerbate algae growths and the concentration of nutrients near the shoreline. At the same time, levels of phosphorous and other nutrients are too low in offshore parts of the Great Lakes, leading to reduced food sources and declines in some fish populations. Bacterial levels are a concern, particularly after heavy rainfall, coming from a variety of sources including agricultural runoff, waterfowl, and overflow from combined sewer systems.²⁰⁰ Most land in southern Ontario is under private ownership. While the acquisition of certain rights to sensitive lands by governments and NGOs has been an important tool, the scope of potential for this tool is limited and it is used infrequently for a variety of reasons. Thus, landowner cooperation in conservation and the adoption of best management practices on private lands is critical to addressing water issues.²⁰¹

A particular incident of bacterial contamination of the municipal water supply in the small town of Walkerton, Ontario, mobilised major changes in the province's approach to protecting

¹⁹⁶ Marbek Resource Consultants 'Assessing the Economic Value of Protecting the Great Lakes Ecosystems' (Final Report submitted to Ontario Ministry of Environment 2010).

¹⁹⁷ Great Lakes Strategy supra (n 192).

¹⁹⁸ *ibid*; Measures were recently put in place to better protect groundwater, including a 2-year moratorium on new or expanded water takings from groundwater by bottling companies, and stricter permit conditions and fees for existing water bottling permits: see Taking Ground Water to Produce Bottled Water, O. Reg. 463/16 and Charges for Taking Ground Water to Produce Bottled Water, O. Reg. 176/17.

¹⁹⁹ Great Lakes Strategy supra (n 192).

²⁰⁰ *ibid*.

²⁰¹ R de Loë, RD Kreuzwiser and D Neufeld 'Local Groundwater Source Protection in Ontario and the Provincial Water Protection Fund' 2005 30(2) *Canadian Water Resources Journal* 129.

drinking water sources. In May 2010, a heavy rain storm washed cattle manure into the well serving the town's 4,800 residents. Contamination of the water with *Escherichia coli* and other bacteria resulted in the deaths of seven people, and over 2,300 became ill. The incident raised the profile of water issues, pollution and the environment generally in the province, and the Ontario government responded by calling a judicial inquiry (commonly referred to as the 'Walkerton Inquiry') to investigate what led to the tragedy and to consider threats to drinking water more broadly in the province. The *Report of the Walkerton Inquiry*, following a two-year review, included a number of recommendations that shaped comprehensive law reform for source water protection, including the *Clean Water Act* described in the sections below.²⁰²

Legal and Institutional Context. Canada is a federal state, composed of ten provinces and three territories. Its constitution, established in 1867, divides legislative powers between the federal and provincial governments.²⁰³ It has a bijural legal system, stemming from English and French colonial ties, with common law applying in matters of public and private law in all provinces except for the province of Quebec, which has a civil law system for matters of private law. Canada remains a constitutional monarchy, with the Queen of Canada (the Queen of the United Kingdom and other Commonwealth realms) as head of state, and the Governor General as her representative at the federal level. There is separation of powers between executive, legislative and judicial branches at both the federal and provincial levels. Municipalities are statutory bodies with powers delegated from the provinces. The Canadian Charter of Rights and Freedoms was added to constitution in 1982, guaranteeing fundamental freedoms and rights related to democracy, equality, aboriginal peoples, and languages, among other things; it does not recognise constitutional rights to property or explicit environmental rights.²⁰⁴

There is no reference to the 'environment' in the constitution, and therefore no assignment of responsibility to the federal or provincial governments for environmental matters specifically. Legislative powers for environmental protection are exercised based on a number of other

²⁰² DR O'Connor, Report of the Walkerton Inquiry: the Events of May 2000 and Related Issues (Ontario Ministry of the Attorney General 2002).

²⁰³ *Constitution Act, 1867* (U.K.), 30 & 31 Vict., c. 3; While territorial governments do not have legislative powers under the constitution, the federal government has devolved powers to the territories.

²⁰⁴ *Constitution Act, 1982, Schedule B to the Canada Act 1982* (U.K.), 1982, c. 11. However, some scholars point out that environmental rights may be implicit in other constitutional provisions, such as rights to life, liberty and security of person and equality rights: Benidickson supra (n 192), 57; LM Collins 'An Ecologically Literate Reading of the *Canadian Charter of Rights and Freedoms*' (2009) 26 *Windsor Review of Legal and Social Issues* 7.

enumerated heads of power, resulting in complex and overlapping roles between the federal and provincial governments.²⁰⁵ The federal government has an important role in interprovincial and international matters, including trans-boundary waters. Federal laws also address pollution prevention, including general prohibitions on the deposit of a deleterious substance in fish habitat or migratory bird habitat;²⁰⁶ while these are strong anti-pollution laws, there are challenges in applying such an approach to managing diffuse pollution sources. There is no federal law setting a nationally-consistent framework for water management in the country, and there are no legally-binding federal water quality standards applicable across Canada.²⁰⁷

The provinces have jurisdiction over local and regional environmental matters. Land use planning is led largely by municipal boards, under policy and legislation of the Ministry of Municipal Affairs.²⁰⁸ There are special protections preventing development of a Greenbelt around Ontario's Golden Horseshoe region, an area of green space, farmland, forests, and wetlands.²⁰⁹ While there is no reference in law to ecosystem services provided by the Greenbelt, the Greenbelt Plan, updated in 2017, makes passing reference to 'ecosystem services' provided by the space, and lists benefits such as mitigation of flooding and impacts from storms, clean air and water, and recreation.²¹⁰ The Greenbelt has been a catalyst for interest in ES in Ontario; for example, one study was commissioned by NGOs to assess the economic value of the Greenbelt, based on an explicit ES framework, and found values of \$2.1B per year for recreational activities, \$224M per year in flood protection for private property, and \$52M per year in carbon sequestration.²¹¹

The Ontario Ministry of Natural Resources and Forestry is responsible for biodiversity protection and management of fish and wildlife, forests, parks and protected areas and provincial

²⁰⁵ Benidickson supra (n 192); For example, under the *Constitution Act, 1867*, supra n (203), the federal government has jurisdiction related to the criminal law, fisheries, navigation, federal lands, and federal works and undertakings: ss. 91 and 92[10]; Provinces have exclusive jurisdiction under the constitution to make laws in relation to the development, conservation and management of non-renewable natural resources and forestry resources, and are responsible for matters of a 'local or private nature' and property and civil rights: ss. 92, 92 A.

²⁰⁶ See s. 36 of the *Fisheries Act* R.S.C., 1985, c. F-14 and s. 5 of the *Migratory Birds Convention Act*, 1994, S.C. 1994, c. 22.

²⁰⁷ The federal government does publish the *Guidelines for Canadian Drinking Water Quality*, developed by a Federal-Provincial-Territorial Committee, setting out recommended limits for specific contaminants, but these standards are not met by all provinces.

²⁰⁸ *Planning Act*, R.S.O. 1990, c. P.13.

²⁰⁹ *Greenbelt Act*, 2005, S.O. 2005, c. 1.

²¹⁰ Ministry of Municipal Affairs, *Greenbelt Plan - 2017*, (Queen's Printer for Ontario, 2017).

²¹¹ *Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital*, Prepared for the Friends of the Greenbelt Foundation by Green Analytics (Friends of the Greenbelt Foundation 2016).

land, and oversight of Ontario's 36 watershed-based Conservation Authorities (CAs).²¹² CAs are local public sector organisations responsible for implementing programmes based on an IWRM approach, including watershed planning, managements of natural hazards, erosion and floods, stewardship and conservation, drought programmes, permitting of designated activities, and source water protection, as described in more detail in the following sections. The first CAs were established in 1946. The province establishes each CA individually on the request of two or more municipalities, and designates their powers and responsibilities, and CAs work with many Ministries and agencies in carrying out their mandate. Ninety percent of Ontario's population lives in a watershed managed by a Conservation Authority.²¹³

The Ministry of Environment and Climate Change (MOECC) is responsible for regulating wastes and pollution, primarily under the *Environmental Protection Act*.²¹⁴ While not the focus of the case study here, the MOECC implements the Ontario Community Environment Fund, which is established as a special purpose fund under the *Environmental Protection Act*, channelling money collected through environmental penalties to a range of environmental improvement projects, including restoration of ecosystems for water quality, reduction of erosion, fish habitat and endangered species habitat.²¹⁵ Provinces have the predominant role in water resources management - in Ontario, this is within the mandate of the MOECC, primarily through the *Water Resources Act*.²¹⁶ While not the focus of the case study here, the *Water Resources Act* also enables water quality trading (which, as discussed in Chapter 3, can be considered a type of PES) and Ontario is considered a front-runner in implementing this type of market trade mechanism.²¹⁷ The Ministry of Agriculture, Food and Rural Affairs manages agricultural land use, including administration of the *Nutrient Management Act, 2002*,²¹⁸ which was also introduced in response to

²¹² 'Ministry of Natural Resources and Forestry' (Government of Ontario) <<https://www.ontario.ca/page/ministry-natural-resources-and-forestry>> accessed 2 May 2018.

²¹³ *Conserving our Future: A Modernized Conservation Authorities Act* (Ministry of Natural Resources and Forestry 2017) <<http://apps.mnr.gov.on.ca/public/files/er/mnrf-17-044-conserving-our-future-en.pdf>> accessed 2 May 2018.

²¹⁴ *Environmental Protection Act*, R.S.O. 1990, c. E.19.

²¹⁵ Environmental Penalties, O. Reg. 222/07, s. 19, generally outlines the types of projects that may be funded; a policy is also in place to guide application selection: 'Ontario Community Environment Fund application guide' (Government of Ontario) <<https://www.ontario.ca/page/ontario-community-environment-fund-application-guide>> accessed 12 March 2018.

²¹⁶ *Water Resources Act*, R.S.O. 1990, c. O.40.

²¹⁷ Y Stanton et al. *State of Watershed Payments: An Emerging Marketplace* (Ecosystem Marketplace 2010); Sustainable Prosperity.

²¹⁸ *Nutrient Management Act, 2002*, S.O. 2002, c. 4.

the Walkerton Inquiry, and is designed to prevent farm nutrients from entering into surface water and groundwater, including by requiring farms to implement nutrient management plans.

Drinking water policy is mostly within the mandate of the MOECC, and residential drinking water and sanitation services are provided by municipalities in accordance with provincial law. All municipal drinking water systems in Ontario (approximately 700) are regulated by the MOECC, and must meet requirements set out in the *Safe Drinking Water Act, 2002* respecting water treatment and distribution and drinking water quality standards.²¹⁹ Over 80 percent of Ontario's population receive their drinking water from municipal drinking water systems.²²⁰ Ontario has also put in place comprehensive legislation mandating source water protection – the *Clean Water Act, 2006*,²²¹ which was introduced following recommendations of the Walkerton Inquiry, and is discussed in greater detail in the section below.

An additional layer of laws apply to the Great Lakes as a trans-boundary water resource shared with the United States, including the *Boundary Waters Treaty* which in 1909 created a framework for the resolution of water-related conflicts between the two countries, and established the International Joint Commission (IJC) as a quasi-judicial body with an investigative and arbitral role.²²² While the IJC originally focussed on flooding and diversion issues, pollution became a serious concern in the 1960s and the IJC had an active role in investigating water quality issues.²²³ This led to the *Great Lakes Water Quality Agreement* of 1972, which was revised in 1978, and amended in 2012.²²⁴ The 2012 agreement encompasses not only pollution, but habitat and species and climate change concerns, in a holistic way that is consistent with the Ecosystem Approach.²²⁵ There is a Canada-Ontario agreement in place to implement objectives related to water quality and

²¹⁹ *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32.

²²⁰ Others from private wells on their property, or certain communities such as mobile home parks depend on non-municipal sources: 'Drinking water' (Government of Ontario) <<https://www.ontario.ca/page/drinking-water>> accessed 2 May 2018.

²²¹ *Clean Water Act, 2006*, S.O. 2006, c. 22 (CWA).

²²² *Treaty Relating to the Boundary Waters and Questions Arising Along the Border between the United States and Canada* (Boundary Waters Treaty), signed January 11, 1909; Benidickson supra (n 192) 74.

²²³ Benidickson supra (n 192) 74.

²²⁴ *Great Lakes Water Quality Agreement*, 15 April 1972, TIAS No 7312; *Great Lakes Water Quality Agreement of 1978*, 22 Nov 1978, Can TS 1978 No 20; *Protocol Amending the Agreement Between Canada and the United States of America on Great Lakes Water Quality, 1978* (2012 Great Lakes Water Quality Agreement).

²²⁵ 'Canada-US Great Lakes water quality agreement' (Government of Canada) <<https://www.canada.ca/en/environment-climate-change/services/great-lakes-protection/canada-united-states-water-quality-agreement.html>> accessed 2 April 2018.

ecosystem health in the Great Lakes,²²⁶ and in 2015, Ontario introduced the *Great Lakes Protection Act* to promote ecosystem-based approaches to water issues in the Great Lakes-St. Lawrence River Basin (discussed in more detail below in relation to its potential to support PES approaches).²²⁷ In 2005, the eight Great Lakes States and the provinces of Ontario and Quebec also entered into the *Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement* to govern water-taking and diversion proposals in the basin.²²⁸

More broadly, there is nascent interest in applying ES as an explicit basis for guiding policy in Canada.²²⁹ The term ‘ecosystem services’ is not found in any law, and there are very few examples of official government policy documents using this term.²³⁰ There are several examples of incentive-based schemes for the protection of the environment and ecosystems in Canada, and some analysis of these schemes has been carried out from the perspective of PES.²³¹ Some programmes have a basis in law; for example, the federal and provincial governments offer tax incentives for land dedicated to conservation purposes.²³² There is a long history of government funded agri-environmental and conservation programmes providing grants to landowners or NGOs working with landowners, funded mainly on an ad-hoc basis without a basis in law.²³³ There are also a number of schemes operated by NGOs on the basis of their own mandates.²³⁴

²²⁶ ‘Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health’ (Government of Canada) <<https://www.canada.ca/en/environment-climate-change/services/great-lakes-protection/canada-ontario-agreement-water-quality-ecosystem.html>> accessed 2 April 2018.

²²⁷ Great Lakes Protection Act, 2015, S.O. 2015, c. 24 (GLPA).

²²⁸ *Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement* (13 December 2005); This is implemented in Ontario under the *Safeguarding and Sustaining Ontario’s Waters Act*, 2007, S.O. 2007, c. 12.

²²⁹ For example, EcoHealth Ontario is a coalition, including conservation authorities, public health associations, municipal and provincial agencies, and universities, that provides a platform for knowledge-sharing and advocacy on the role of ecosystems in supporting public health, founded in ES theory: ‘EcoHealth Ontario’ <<http://www.ecohealth-ontario.ca>> accessed 2 January 2018.

²³⁰ For example, Canada’s 2020 Biodiversity Goals and Targets make reference to the ecosystem services.

²³¹ *Ecosystems and Biodiversity in Canada: A Survey of Economic Instruments for the Conservation & Protection of Biodiversity* (Sustainable Prosperity June 2011)

²³² Federal income tax deductions for ecological gifts are set out in the *Income Tax Act*, R.S.C., 1985, c. 1, ss. 118, 207.31; Property tax exemptions under Ontario’s Conservation Land Tax Incentive Program are established in regulation: General, O. Reg. 282/98, Part IV.

²³³ See, for example: ‘Archive of Agri-Environmental Programs in Ontario Before 2000’ (AgriArchive) <<http://agrienvarchive.ca/>> accessed 2 June 2017.

²³⁴ ALUS (Alternative Land Use Services) Canada is an NGO that is implementing PES schemes involving farmers and ranchers, explicitly based on an ES-approach: ALUS Canada <<https://alus.ca>> accessed 5 March 2018; The NGO Ducks Unlimited partners with landowners to restore wetlands: ‘Resources for Landowners’ (Ducks Unlimited Canada) <<http://www.ducks.ca/resources/landowners/>> accessed 5 March 2018.

A Government of Canada policy paper, resulting from a working group that considered ES specifically, expressed reluctance to apply incentive programmes in the agricultural sector, and noted inefficiencies with nationally-consistent schemes such as the United States Conservation Reserve Enhancement Program.²³⁵ Also of interest, a recent Parliamentary review of protected areas reported that “the Committee heard that more conservation tools are needed, and that the government should consider other countries’ experiences at creating incentives for maintaining wildlife habitat on private lands”, and included recommendations in this regard.²³⁶

Overview of the legal framework for payments for ecosystem services. There are two examples of legislation in Ontario that include enabling provisions for PES at the local level for water-related ES: The *Clean Water Act* (CWA), introduced in 2006, which provides for watershed-level source protection planning; and the *Great Lakes Protection Act* (GLPA), introduced in 2015, which creates a framework for geographically-based initiatives to protect and restore the ecological health of the Great Lakes-St. Lawrence basin. The CWA will be the main focus here, but there are some important parallels with the *Great Lakes Protection Act* (GLPA), which is in earlier stages of implementation.

The CWA was introduced in 2005 in response to the Walkerton Inquiry. The Inquiry recommended a multi-barrier approach to addressing drinking water threats, and highlighted the need for regulations to be complemented by voluntary, incentive-based approaches and community engagement.²³⁷ The CWA sets out a comprehensive framework for watershed-based source protection planning to protect municipal drinking water in the province, including legally-binding and voluntary measures. It includes specific provisions enabling incentives and stewardship programmes to be implemented as part of plans, among other measure to address threats to drinking water.²³⁸ However, as discussed below, locally-organised and funded PES schemes are not well-established under this regime. The CWA also establishes a provincial funding mechanism

²³⁵ *Ecological Goods and Services - Policy Considerations for Canadian Agriculture* (Her Majesty the Queen in Right of Canada, represented by the Minister of Agriculture and Agri-Food, 2013).

²³⁶ See: *Taking Action Today: Establishing Protected Areas for Canada’s Future* (Report of the Standing Committee on Environment and Sustainable Development, March 2017), p. 49 and Recommendation 35: “The Committee recommends that the Government of Canada consider innovative funding and other mechanisms to support and expand conservation and protected areas, including: By examining ways – including compensation – by which it can partner with provinces and territories to further support and encourage ranchers, farmers and other private land owners to implement conservation measures [...]”

²³⁷ Walkerton Inquiry supra (n 202).

²³⁸ CWA supra (n 221), s. 22(7).

administered by the MOECC to support implementation of the Act - the Ontario Drinking Water Stewardship Program (ODWSP)²³⁹ - which has supported grants to landowners, roughly consistent with the model of state-run PES schemes under 'establishing' legal frameworks. However, as discussed below, it does not appear to be the MOECC's intention to support PES long-term under the ODWSP.

Interestingly, the provisions of the CWA relating to incentive programs under SPPs, and the provisions establishing the ODWSP, were not in the original version of the legislation, as proposed in the bill put forward by government.²⁴⁰ As part of the legislative process, a bill is generally referred to a standing committee of the legislature for review; the committee often carries out stakeholder consultations on the bill and can make amendments before reporting the bill back to the legislature. When the proposed CWA was reviewed, consultations carried out by the committee clearly demonstrated a community desire for incentive-based approaches.²⁴¹ The committee found the legislation as proposed to be lacking in terms of implementing the recommendations of the Walkerton Inquiry related to community engagement through incentives for stewardship. As a result, the committee amended the bill to include the sections relating to incentives and the ODWSP, as they exist in the current Act.²⁴² This may signal that government was not fully supportive of incentive-based approaches even though these provisions were included in the Act.

6.4.2 PES Actors, Administration and Oversight

Administration and oversight. The institutional arrangements providing for administration and oversight of SPPs, which are set out in detail under the CWA and its regulations, provide the framework for any PES schemes that are developed within those SPPs. Under the CWA, Conservation Authorities are designated 'source protection authorities' and have responsibilities to

²³⁹ CWA supra (n 221), s. 97.

²⁴⁰ Bill 43, 2005: An Act to protect existing and future sources of drinking water and to make complementary and other amendments to other Acts (original) <<https://www.ola.org/en/legislative-business/bills/parliament-38/session-2/bill-43>> accessed 2 June 2017.

²⁴¹ See, e.g. 'Standing Committee on Social Policy - Transcripts from Monday 21 August 2006' (Legislative Assembly of Ontario) <<https://www.ola.org/en/legislative-business/committees/social-policy/parliament-38/transcript/committee-transcript-2006-aug-21>> accessed 2 June 2017.

²⁴² Bill 43, 2006: An Act to protect existing and future sources of drinking water and to make complementary and other amendments to other Acts (As Amended by Standing Committee) <<https://www.ola.org/en/legislative-business/bills/parliament-38/session-2/bill-43>> accessed 2 June 2017; CWA supra (n 221), ss. 22(7), 97.

lead the source protection planning process in their designated source protection area.²⁴³ CAs are managed by a board of directors appointed by municipalities (most are elected municipal officials), as set out in the *Conservation Authorities Act*;²⁴⁴ they are not provincial government entities, and there are no provincial appointees on the board.

Source protection authorities are responsible for establishing a source protection committee in their designated source protection areas.²⁴⁵ The Minister may consolidate source protection areas into regions and designate a lead source protection authority.²⁴⁶ Regulations under the CWA have designated thirty-six source protection areas under regulations, ten of which are grouped into regions,²⁴⁷ which are represented by a total of nineteen source protection committees with lead source protection authorities.²⁴⁸ Eighteen of the nineteen source protection committees represent areas within the Great Lakes-St. Lawrence Basin.²⁴⁹ Source protection authorities appoint committee members in accordance with regulations, which set out the minimum and maximum number of members for each committee (with the maximum ranging from 9 to 21), and require that one-third of members must be appointed to reflect municipal interests, one-third must be appointed to reflect agricultural, commercial or industrial sectors, and one-third must be appointed to reflect other interests including environmental and health.²⁵⁰

Source protection committees prepare source protection plans (SPPs) in accordance with requirements in the CWA and regulations.²⁵¹ If the source protection area contains water that flows into the Great Lakes, the CWA requires consideration of the *Great Lakes Water Quality Agreement* and other agreements relating to the Great Lakes.²⁵² The Act requires that source protection authorities complete a risk assessment report that identifies vulnerable areas and drinking water threats,²⁵³ and SPPs must include policies that address each threat.²⁵⁴ The CWA enables a ‘toolbox’ of different measures, including legally enforceable prohibitions or regulations

²⁴³ CWA supra (n 221), s. 4.

²⁴⁴ *Conservation Authorities Act*, R.S.O. 1990, c. C.27.

²⁴⁵ CWA supra (n 221), s. 7.

²⁴⁶ CWA supra (n 221), s. 6.

²⁴⁷ Source Protection Areas and Regions, O. Reg. 284/07.

²⁴⁸ Source Protection Committees, O. Reg. 288/07.

²⁴⁹ Great Lakes Strategy supra (n 193).

²⁵⁰ Source Protection Committees, O. Reg. 288/07.

²⁵¹ CWA supra (n 221), s. 22; General O. Reg. 287/07.

²⁵² CWA supra (n 221), s. 14.

²⁵³ CWA supra (n 221), s. 15.

²⁵⁴ CWA supra (n 221), s. 22.

on activities that pose a threat to drinking water. The Act also allows for land to be designated only for certain uses, and provides that SPPs take precedence over other land use planning instruments (such as municipal zoning). SPPs must be submitted and approved by Minister of Environment and Climate Change.²⁵⁵

Among these other tools, the CWA provides specifically that SPPs may include policies that govern the use of incentives and outreach, education and stewardship programs.²⁵⁶ This enables PES approaches to be implemented as part of an SPP package, in accordance with any rules developed under SPP policies. The CWA also establishes the Ontario Drinking Water Stewardship Program (ODWSP) and states that its purpose is to provide financial assistance to: i) persons whose activities are affected by the Act; and ii) persons and bodies who administer incentives programs and education and outreach programs that are related to source protection plans.²⁵⁷ This provides a potential mechanism for the province to channel funds to locally-organised PES that could be established within SPPs. Regulations under the CWA specified that financial assistance under the ODWSP would be determined in the basis of applications (while not providing any direction on how applications should be prioritised), and would be subject to any conditions set out in an agreement with the Minister.²⁵⁸ As discussed below, in practice the ODWSP was used to support implementation of the Act in initial stages, and there are no plans to use it as a mechanism to support long-term PES schemes; funding was not extended past 2012.²⁵⁹

Twenty-two source protection plans are currently in place (representing all of the designated source protection areas and regions);²⁶⁰ these cover 450 municipal drinking water systems in a geographic area that covers 95 percent of Ontario's population (but only 14 percent of the province's total area).²⁶¹ Several of the SPPs set out policies to consider development of incentives programs, and several point to the desire to collaborate with the provincial ODWSP, but

²⁵⁵ CWA supra (n 221), s. 25.

²⁵⁶ CWA supra (n 221), s. 22(7).

²⁵⁷ CWA supra (n 221), 97.

²⁵⁸ General, O. Reg. 287/07, s. 69.

²⁵⁹ 'Source protection' (Government of Ontario) <<https://www.ontario.ca/page/source-protection>> accessed 2 May 2018.

²⁶⁰ 'Minister's Annual Report on Drinking Water 2017' (Government of Ontario) <<https://www.ontario.ca/page/ministers-annual-report-drinking-water-2017>> accessed 2 March 2018.

²⁶¹ 'Chapter 3: Ministry of Environment and Climate Change – 3.12 Source Water Protection' in *2014 Annual Report of the Office of the Auditor General of Ontario* (Tabled in the Legislative Assembly of Ontario on December 9, 2014).

none actually establish PES schemes under their policies. Some examples of language used in relevant SPP policies include:

- That the provincial government “should make available an incentive program”;²⁶²
- That CAs should “support and facilitate the implementation of existing incentive programs, such as the Ontario Drinking Water Stewardship Program” and “seek out incentive programs that promote and financially support that promote and financially support the use of best management practices for activities that are or would be significant drinking water threats;”²⁶³
- That municipalities, in collaboration with other bodies and governments “may develop and implement incentive programs directed at significant drinking water threat activities... where such programs are deemed necessary and/or appropriate and subject to available funding;”²⁶⁴
- That the MOECC should “consider extending and expanding the Ontario Drinking Water Stewardship Program”... and the CA should “consider establishing a local incentive program.”²⁶⁵

A separate planning process is established related to the protection and restoration of ecosystems in the Great Lakes-St. Lawrence Basin, under the GLPA. The Minister may direct public bodies (such as CAs, municipalities, and/or provincial agencies) to undertake geographically-based initiatives under the GLPA,²⁶⁶ and the Act includes a list of legally-binding and voluntary measures that may be included in initiatives. “Stewardship programs” and “programs that specify and promote best management practices” are listed among voluntary measures, which could include PES.²⁶⁷ The Ontario Minister of Environment and Climate Change invites representatives of municipalities, First Nations and Métis communities, CAs, environment groups, the scientific community and the industrial, agricultural, recreational and tourism sectors to participate in a

²⁶² Approved Source Protection Plan: Saugeen, Grey Sauble, Northern Bruce Peninsula Source Protection Region (16 October 2015), Policy G-05.

²⁶³ Trent Source Protection Plan (Approved 23 October 2014, updated 15 February 2018), Policy G-4(1) and Policy G-4(2).

²⁶⁴ Approved Source Protection Plan: Kettle Creek Source Protection Area (8 September 2014), Policy KCSPA-CW-1.5.

²⁶⁵ Cataraqui Source Protection Plan (Approved 26 November 2014), Policy 4.5.1-NB and Policy 4.5.2-NB.

²⁶⁶ GLPA supra (n 227), s. 11.

²⁶⁷ GLPA supra (n 227), Schedule 3.

Great Lakes Guardians' Council.²⁶⁸ The Council is a forum to advise the Minister, among other things, on proposals for initiatives, identifying priorities for action, and identifying “potential funding measures and partnerships” for projects to achieve the objectives of the Act, which also points to the potential for PES. The Great Lakes Guardians’ Council was established in 2016, and has met three times. Council meeting notes indicate there has been general discussion on the potential for incentives, challenges in addressing non-point source pollution, and the potential for initiatives to contribute to drinking water safety. However, this has not resulted in proposals for PES schemes, and it is not clear how initiatives under the GLPA may be integrated with SPPs under the CWA.²⁶⁹

While not established in law, the province also created the Great Lakes Guardian Community Fund in 2012, and put out a new call for applications in 2018, to provide grants to community groups for projects that protect and restore Great Lakes ecosystems.²⁷⁰ Grants are awarded to support projects with a direct environmental benefit, towards the goals of: protecting water quality for human and ecological health; improving wetlands, beaches and coastal areas; and protecting habitats and species, and may include projects carried out on private land. The Fund is a good example of PES funded by the provincial government, but it exists outside the legislative planning framework of the GLPA or the CWA and is not a good example of legal frameworks for PES.

Beneficiaries, buyers and funding. While the CWA enables policies on incentives to be included in SPPs, it does not identify possible funding sources that CAs or municipalities might use to support incentives schemes. None of the SPPs have included policies that identify specific funding sources for incentives. Property taxes are the main source of funding for municipalities in Ontario, but must support a range of municipal services and infrastructure; a report by the Ontario Auditor General identified particular challenges for smaller municipalities to implement SPPs.²⁷¹ CAs are funded on average based on 54 percent municipal levies, 34 percent self-generated revenue, 9 percent provincial funding and 3 percent federal funding. A recent review of legislation governing CAs identified funding challenges for CAs, and the legislation was amended in 2017,

²⁶⁸ GLPA supra (n 227), s. 4(3).

²⁶⁹ ‘Great Lakes Guardians’ Council’ (Government of Ontario) <<https://www.ontario.ca/page/great-lakes-guardians-council#section-2>> accessed 5 May 2018.

²⁷⁰ GLPA supra (n 227), s. 4(4). A policy is in place to guide application selection: ‘Great Lakes Guardian Community Fund: 2018 Application Guide’ (Government of Ontario 2007) <https://www.grants.gov.on.ca/prodconsum/groups/grants_web_contents/documents/grants_web_contents/prd_r017747.pdf> accessed 18 May 2018.

²⁷¹ 2014 Annual Report of the Office of the Auditor General of Ontario supra (n 261).

providing, among other things, new powers for self-generated revenue through mechanisms such as user fees, while these amendments are not yet in force.²⁷² In addition, the Government committed to assess the adequacy of provincial funding to implement provincially-mandated programmes, and to explore how existing funding opportunities could be better leveraged and coordinated.²⁷³

The CWA does establish the ODWSP as a provincial source of funds that might be applied to help CAs and municipalities administer incentives programmes, or directly to assist persons whose activities are affected by the Act.²⁷⁴ Substantial resources were dedicated to the ODWSP, which provided Can \$24.5 million over 5 years, to support “over 3,000 local actions by landowners to protect water supplies.”²⁷⁵ However, the ODWSP was used only as a bridge to support early actions for source water protection before SPPs were formally in place. No new funds have been disbursed under the PDWSP since 2012.²⁷⁶

Separately, the province invested an additional Can \$14 million in grants to support small and rural municipalities towards implementation of SPPs between 2013 and 2018, and it provided Can \$7.5 million between 2012 and 2018 to the Great Lakes Guardian Community Fund.²⁷⁷ Although the ODWSP is enshrined in the CWA, which implies it is a stable long-term funding source, the province has followed the same model for the ODWSP as for other grant programmes: funded on an ad-hoc basis, for specific funding cycles, according to priorities established for that specific funding cycle. While there may be advantages to tailoring different funding programmes to meet the needs of specific objectives (and the government may prefer to spread resources among constituents and be reluctant to commit to long-term funding), there are inefficiencies in spreading funding across many programmes with related but uncoordinated policy goals. From the perspective of ES, there is a need to coordinate actions on landscape level to achieve meaningful changes in ES, which would be better served by a more focussed funding programme than multiple disparate granting programmes. There is also substantial increased administrative burden on the side of the province and applicants to administer and apply to multiple schemes.

²⁷² See *Building Better Communities and Conserving Watersheds Act, 2017*, S.O. 2017, c. 23, s. 21, amending the *Conservation Authorities Act*, R.S.O. 1990, c. C.27 to add new s. 21.2, which is not yet in force.

²⁷³ *Conserving our Future* [...] supra (n 213).

²⁷⁴ CWA supra (n 221), 97.

²⁷⁵ ‘Source protection’ supra (n 259).

²⁷⁶ *ibid.*

²⁷⁷ Minister’s Annual Report on Drinking Water 2017 supra (n 260).

The Ontario Auditor General expressed concern that “The Ministry lacks a long-term strategy that addresses funding and oversight of municipalities and Conservation Authorities to ensure the plans, once approved, are implemented”²⁷⁸, which applies to SPPs generally, including the potential to implement any incentive programmes within such schemes. The wording of policies on incentive programmes that were included in SPPs, as listed in the section above, identifies a clear desire on the part of CAs and municipalities for the province to continue the ODWSP. The Walkerton Inquiry report recommended an approach based on a principle of cost sharing, so that the burden of compliance with stricter requirements for sources water protection, which has broad benefits, was not incurred only by landowners located in sensitive areas. The report identified a range of possible funding sources including provincial general revenues, municipal general revenues, user fees, and charges on pollution.²⁷⁹ However, it does not appear that, beyond the ODWSP, specifically dedicated sources of funds for incentives have been fully explored.

Eligibility for payments. The CWA does not set out specific eligibility requirements for potential recipients of incentives programmes. None of the SPPs has included detailed policies on incentives programmes, and as such have not included specific eligibility criteria.

With respect to the ODWSP, the CWA states broadly that funds may support any ‘persons or bodies’: whose activities or properties are affected by this Act; who administer incentive programs and education and outreach programs that are related to source protection plans; and other persons and bodies, in circumstances specified in regulations.²⁸⁰ Further to this section, regulations state that financial assistance may be provided to a person or body that uses the financial assistance to administer an incentive program to encourage persons to take action to protect an existing or future source of drinking water, whether or not in a designated source protection area. These provisions broadly tie eligibility to the goal of the CWA in protecting drinking water sources. They also enable the province to either (or both) provide direct payments to persons or bodies to implement actions with respect to specific properties, or to fund CAs and municipalities to implement locally administered incentive programmes.

²⁷⁸ 2014 Annual Report of the Office of the Auditor General of Ontario supra (n 261), 410.

²⁷⁹ Walkerton Inquiry supra (n 202), Recommendation 16.

²⁸⁰ CWA supra (n 221), s. 97(2).

6.4.3 PES Design

Targeting ecosystem services. The CWA and its regulations include detailed requirements related to the targeting of measures to address drinking water threats under SPPs, which would provide the framework for any PES schemes that are developed within those SPPs. The CWA sets out parameters for geographic targeting of “vulnerable areas” where drinking water threats must be identified and addressed.²⁸¹ Vulnerable areas are defined by the Act and regulations to mean:²⁸²

- A significant groundwater recharge area: an area within which it is desirable to regulate or monitor drinking water threats that may affect the recharge of an aquifer;
- A highly vulnerable aquifer: an aquifer on which external sources have or are likely to have a significant adverse effect, and includes the land above the aquifer;
- A surface water intake protection zone: an area that is related to a surface water intake and within which it is desirable to regulate or monitor drinking water threats; or
- A wellhead protection area: an area that is related to a wellhead and within which it is desirable to regulate or monitor drinking water threats.

These broad definitions give source protection committees discretion to define the geographic areas where SPP policies will apply as they consider appropriate.

SPPs must address twenty-one specific threats, which are prescribed by regulations: these include addressing several sources of diffuse pollution such as the application of manure, sewage biosolids, chemical fertilizers and pesticides to land, and the use of land for livestock grazing; threats to water quantity must also be addressed, including any activity that reduces recharge of an aquifer.²⁸³ ES-based approaches could be applied to address these threats, which could provide the basis for targeting of payment mechanisms under local incentive schemes. The ODWSP did provide funding to support actions based on these targets, which included funding for ES-related activities such as runoff and erosion control measures, along with funding for improvements to built infrastructure such as closing or upgrading wells or upgrading septic systems.²⁸⁴

Structure of incentive and payment terms and conditions. The CWA does not include any specific guidance on how potential incentive programmes would be structured under SPPs. None of the SPPs has included detailed policies on incentives programmes, and as such have not included

²⁸¹ CWA supra (n 221), ss. 15 (2), 22(2).

²⁸² CWA supra (n 221), s. 2(1); General, O. Reg. 287/07, s. 1(1).

²⁸³ CWA supra (n 221), s. 2(1); General, O. Reg. 287/07, s. 1.1.

²⁸⁴ ‘Source protection’ supra (n 259).

specific guidance on the structure of incentives. With respect to the ODWSP, regulations require broadly that every grant of financial assistance “is subject to the condition that the recipient of the financial assistance enter into a contract with the Minister that governs the use of the financial assistance and includes a requirement that the recipient report to the Ministry on the use of the financial assistance.”²⁸⁵ There is no further guidance on terms and conditions that must be included in the contract.

Monitoring and enforcement. The CWA does not include any guidance on monitoring and enforcement of incentive programmes specifically. None of the SPPs has included detailed policies on incentives programmes, and as such have not included specific guidance on the monitoring and enforcement of incentives. With respect to the ODWSP, as stated above regulations broadly require that recipient of financial assistance enter into a contract with the Minister and report to the Minister on how funds were used.²⁸⁶

The CWA and its regulations do include detailed requirements related to monitoring and enforcement of SPPs generally. For example, SPPs must include policies respecting the monitoring of vulnerable areas,²⁸⁷ and source protection authorities must submit annual progress reports that describe the results of monitoring programmes, and must describe measures that have been taken to implement the SPP and address drinking water threats.²⁸⁸ The implementation of any incentives programmes as part of SPPs would be subject to this monitoring and reporting regime under the Act. Given that incentives programmes are voluntary measures that may or may not be included in SPPs, they are not legally enforceable under enforcement powers that provide for enforcement of other measures (such as prohibited or regulated activities or restrictions on land use).²⁸⁹

6.5 Discussion and Conclusions

The examples of ‘enabling’ legal frameworks in New York, England and Ontario are characterised by a lower level of legislative guidance for PES compared to the examples of ‘regulating’ and ‘establishing’ legal regimes in the jurisdictions considered in Chapters 4 and 5. More aspects of PES design and administration are determined at the level of PES agreements, rather than being set out in the general law. However, these enabling legal frameworks still

²⁸⁵ General, O. Reg. 287/07, s. 69.

²⁸⁶ General, O. Reg. 287/07, s. 69.

²⁸⁷ CWA supra (n 221), s. 22(2).

²⁸⁸ CWA supra (n 221), s. 46.

²⁸⁹ CWA supra (n 221), Part IV.

influence the development of PES in important ways without stand-alone laws that establish or regulate PES. New York City operates one of the most well established and most cited examples of PES globally. Features of federal U.S. law enable this scheme, within the context of compliance with regulatory requirements to protect drinking water sources. England has some emerging examples of PES led by water service providers, with an enabling legal and policy context and specific regulatory reforms to encourage uptake of PES. Ontario is notable for its comprehensive legal framework enabling a range of tools for watershed-based protection of drinking water sources, and specifically enables PES at the local level, while such schemes have been slow to develop in practice.

The role of government and institutions for PES. The legal frameworks enabling PES in New York, England and Ontario do not create separate structures for PES. Aspects of the law are important in enabling the development of PES within existing institutions that provide for watershed protection, without creating detailed rules specific to PES. The legal framework in New York is the least explicit about enabling PES specifically: the federal law and EPA regulations merely enable the possibility of avoiding drinking water filtration requirements, which can be satisfied through a range of means of watershed protection. This flexibility is a key enabling feature of the law, but the use of PES is not specifically indicated in law or policy. Similarly in England, Ofwat's results-based approach requires water companies to meet drinking water outcomes, through a range of means that might include PES. While nothing in the law specifically points to PES, Ofwat and Defra policy do explicitly encourage PES. The Ontario law addresses the possibility of PES most directly, by including specific provisions for incentives as part of source water protection.

Within the legal frameworks that assign responsibilities for drinking water, the laws in New York, England and Ontario provide clarity that it is permissible for municipal governments, water companies and/or other public bodies to fund and participate in PES within their mandates. In this case of England especially, commentators have emphasised the importance of regulatory changes and Ofwat's approval, for the first time in 2010, of capital investment by a water company on third-party land, which was critical to enabling Upstream Thinking.²⁹⁰ Prior to this, there was a risk that Ofwat would not allow water companies to use water bill revenues to fund investments in

²⁹⁰ L Smith 'The United Kingdom case study: Payments for ecosystem services (PES) and collective action - 'Upstream Thinking in the South West of England' in OECD (ed) *Providing Agri-environmental Public Goods through Collective Action* (OECD Publishing 2013); H Cook 'An Assessment of Intermediary Roles in Payments for Ecosystem Services Schemes in the Context of Catchment Management: An Example from South West England' (2017) 19(1) *Journal of Environmental Assessment Policy and Management* 1750003.

catchment management schemes. In that case, the incentives for water companies to invest in natural capital were much lower than the incentives for them to invest in built capital.²⁹¹ The case of Upstream Thinking has since achieved national recognition as a model to potentially be replicated, has gained several industry awards, and has contributed to changing perspectives in the industry.²⁹²

National, federal, state and provincial governments play a less significant role in PES in New York, England and Ontario compared to the national governments in the jurisdictions considered in Chapters 4 and 5. Most decisions about the design of PES are made at the local level. The New York State government did have an important role in assisting the City in coordinating the memorandum of agreement with landowners (which is more appropriate than the federal government taking a role, given the context of federalism).²⁹³ In the case of England, policies and the Defra pilots provide some encouragement, but limited guidance for PES. The Defra pilot experiences revealed that a common challenge to launching PES is the need for collective action where multiple players are involved, in the absence of clear institutional arrangements or formal coordination with other planning processes.²⁹⁴ In Ontario, the provincial government has provided guidance and oversight of source water protection planning, but there are no apparent efforts to build capacity for PES specifically.

The Watershed Agricultural Council and Westcounty Rivers Trust have played crucial roles as NGO intermediaries in the New York scheme and Upstream Thinking, respectively. In this regard, some have noted that Upstream Thinking represents a genuine innovation by the privatised water industry in partnering with an environmental charity. NGOs have some advantages in administering PES; for example, where there may be reluctance on the part of landowners to voluntarily engage with regulators, NGOs can be a good fit as value-driven, not for profit, and politically neutral organisations.²⁹⁵ Some advocates of PES in England have also suggested that, in the absence of a stronger role from government, PES buyers could organise in formal coalitions (such as a limited liability partnership), in order to pool funds, and sellers could create institutions through a 'land

²⁹¹ *Capex bias in the water and sewerage sectors in England and Wales: substance, perception or myth? A discussion paper* (Ofwat 2011)

²⁹² Smith supra (n 290); Cook supra (n 290).

²⁹³ Pires supra (n 8).

²⁹⁴ Defra Pilot Review, 2016.

²⁹⁵ Cook supra (n 290).

managers consortium' to coordinate actions and seek buyers.²⁹⁶ In Ontario, Conservation Authorities are established entities that are able to coordinate actions at the watershed level, working with provincial agencies, municipalities and landowners. In this role, they are ideally situated to coordinate PES, but do not necessarily have the financial resources to fund it.

Application of the ES concept. In contrast to the examples in Chapters 4 and 5, the legal frameworks in New York, England and Ontario do not explicitly adopt the ES framework in law. Rather than being focused on the protection of ES, with the provision of drinking water sources being one ES of interest, these examples have introduced PES within a framework focused on the protection of drinking water, of which ES is one component in achieving that objective.

Some commentators have even questioned whether the Catskills example truly supports the case for ES. It is argued that implementation of the scheme was motivated by the legal and political context of needing to *demonstrate* that new EPA requirements were met, even though very little had changed on the ground, and there was very little scientific evidence that the scheme enhanced water quality compared to the status quo.²⁹⁷ Also, in early stages of the scheme, landowners were slower to engage in incentives for activities such as planting native species along streams, as compared to the infrastructure subsidies that were also offered.²⁹⁸ In the case of forestry, the scheme directly helps with the costs of regulatory compliance, which on the face of it does not appear to provide any additional ES. However, from the perspective of the now 20 year history of the scheme, it has had important long-term success in maintaining a landscape conducive to good water quality, as well as a number of other ES in terms of wildlife habitat and recreation. Even without short-term additionality, it could be the case that subsidising forest and agricultural land uses has encouraged retention of these land uses; otherwise, land may have been converted to more ecologically destructive uses, such as residential development. Extensive monitoring programmes that were introduced concurrent with the payments scheme also now provide an evidence base showing the benefits of ES-based interventions for managing diffuse pollution.²⁹⁹

²⁹⁶ Francis, A. et al, *New Markets for Land and Nature: How Natural Infrastructure Schemes Could Pay for a Better Environment* (Green Alliance, 2016).

²⁹⁷ M Sagoff 'On the value of natural ecosystems: The Catskills parable' (2002) 21(1) *Politics and the Life Sciences* 19.

²⁹⁸ Salzman, J 'Creating markets for ecosystem services: notes from the field' (2005) 80 *New York University Law Review* 870.

²⁹⁹ FAD New York City Filtration Avoidance Determination supra (n 45).

Commentators in England have noted a shift in policy on the part of the water industry towards recognition of ES, and greater openness to catchment-based approaches to manage surface run-off and mitigate water pollution, rather than relying exclusively on water treatment solutions.³⁰⁰ ES related to water quality is seen by the water industry as the most important result of catchment management, and the primary rationale for investing in these activities, while carbon storage, recreation, flood protection and protection of wildlife and the natural environment generally were also used to bolster the rationale for investments.³⁰¹ The role of Westcountry Rivers Trust in the design and administration of the Upstream Thinking scheme is also an important factor in terms of attention being paid to concerns for broader protection of nature.

In the case of Ontario, while the ES terminology is not explicit, protection of ecosystem functions is considered as an important aspect of a multi-barrier approach to source water protection. In this context, the Ontario government invested in research to support science-based identification of sensitive areas related to drinking water, and understanding the link between ecosystem conditions in these areas and water quality, which was critical to the design of targeted interventions.³⁰² This is highly consistent with an ES-based approach. While there is no indication that government policy has applied the lens of ES and PES in considering potential incentives within source water protection planning, some outside commentators view the Ontario Drinking Water Stewardship Program as a type of PES.³⁰³ Also, the more recent *Great Lakes Protection Act* demonstrates an approach that is attuned to ES as the basis for interventions to protect and restore ecosystems.

The rationale and theory for PES. The rationale for PES in the case of New York and England's Upstream Thinking scheme is based most directly on the cost savings considerations related to water treatment. These examples show the most direct connection between ES providers and ES users, compared to any of the other case studies examined here. There is also generally more concern about whether PES is consistent with the polluter pays principle, and especially about the use of public funds to reward 'polluters' in the context of New York, England

³⁰⁰ Cook supra (n 290); L Mathieu, R Tinch and A Provins 'Catchment management in England and Wales: the role of arguments for ecosystems and their services' (2016) *Biodiversity and Conservation* <https://doi.org/10.1007/s10531-016-1176-9>

³⁰¹ Mathieu supra (n 300).

³⁰² de Loë, Kreutzwiser and Neufeld supra (n 201).

³⁰³ Sustainable Prosperity (n 231).

and Ontario, compared to the other case studies. Social justice considerations and alleviation of rural poverty are not as clear justifications in these cases, especially as compared to the national programmes in the developing country context of Costa Rica and Ecuador. However, rural development goals and economic disparity between urban and rural communities remains relevant.

In the case of New York, there was particular concern about upholding the polluter pays principle in the context of constitutional rights to property and the threat of litigation. There were some best management practices that certain stakeholders believed should be made mandatory in regulations, but government efforts to introduce regulations were hampered legally and politically.³⁰⁴ On the other hand, the memorandum of agreement, including PES, was seen by some as an equitable and mutually beneficial solution that avoided legal animosities, that could have ultimately derailed watershed protection efforts. The voluntary engagement of stakeholders was seen as a more successful strategy to support environmental stewardship.³⁰⁵

The policy discussions in the UK have been the most explicit in adopting ES and PES as a lens to frame considerations. Some commentators in England have noted a marked shift from a strict “polluter pays” philosophy to one in which some “beneficiary pays”/“stewards earn” element is accepted, and arguments associated with ecosystem service values are increasingly effective in motivating water industry investments in catchment-level conservation projects.³⁰⁶ South West Water itself explains its rationale in ‘Upstream Thinking’ in detail as follows:

We ask a lot from landowners in our rural catchments. We ask them to produce food, which they can get paid for, but we also ask them to deliver clean water, protect biodiversity, contribute to flood defence, manage landscape character and accommodate recreation and access, most of which they cannot get paid for. Unsurprisingly they struggle to deliver all of these services to the level required by society. Instead of resorting to prosecuting landowners for not delivering all of the above services under the traditional ‘polluter pays principle,’ ... landowners should be financially encouraged and rewarded for their positive actions in what could be described as a new ‘provider is paid principle’... South West Water recognized that it is cheaper to help farmers invest in improvements that deliver cleaner raw water (water in rivers and streams) than it is to pay for the ongoing expensive filtration equipment required to treat polluted water... water consumers would be better served by spending a small proportion of the money raised from the water bill on catchment restoration in the short term rather than a larger proportion, on water filtration in the long term. In the longer term water consumers (all of us) will benefit financially.³⁰⁷

³⁰⁴ Salzman supra (n 298).

³⁰⁵ Pires supra (n 8).

³⁰⁶ Cook supra (n 290); Mathieu, Tinch and Provins supra (n 300).

³⁰⁷ ‘Upstream Thinking 2’ supra (n 166).

Ofwat also now considers that: “water customers could legitimately expect to pay for those elements of catchment management that bring direct and measurable benefits to them, under the principle of paying for ecosystem services.”³⁰⁸ This evolution is partly pragmatic, recognising that strict adherence to the polluter pays principle would not be feasible within the wider social and economic context, and could have the perverse effect of blocking catchment management initiatives.³⁰⁹ Defra’s *Action Plan* observes that water company investment in catchment management will be limited by commercial self-interest.³¹⁰ Where such private economic incentives do not exist, ecosystem services may not be protected more broadly without public or philanthropic spending.

In the Ontario case, issues of fairness were raised in the source water protection context where higher regulatory standards would be imposed on landowners located in sensitive areas. Spatially targeted interventions are important from the perspective of prioritising protection of ES, but contrasts with traditional regulatory approaches, which are normally applied consistently across a sector (for example, for reasons of administrative fairness and to maintain an equal field of competitiveness). The Walkerton Inquiry report framed these issues through a principle of cost sharing, which would recognise that landowners who happen to be located on areas that are particularly important to drinking water quality should not bear the full burden of compliance with source water protection, given that benefits accrue to water users and the broader public.³¹¹

There is potential for policy in this area to be further developed by applying a PES lens. There are some NGO advocates for PES approaches³¹², as well as support from farmers. One analysis based on landowner questionnaires in rural Ontario in 2009 found that farmers opposed what they viewed as “excessive” regulation but wanted government financial support for implementing environmental practices voluntarily.³¹³ Some commentators are of the view that funding for agri-environmental programmes more broadly may shift to give greater attention on ES:

³⁰⁸ *From catchment to customer: can upstream catchment management deliver a better deal for water customers and the environment?* (Ofwat 2011) 21, http://www.ofwat.gov.uk/sustainability/prs_inf_catchment.pdf. Accessed 01 Oct 2014

³⁰⁹ Mathieu, Tinch and Provins *supra* (n 300), 14.

³¹⁰ Defra *supra* (n 146).

³¹¹ Walkerton Inquiry *supra* (n 202), Recommendation 16.

³¹² ALUS Canada *supra* (n 234).

³¹³ GC Filson et al. ‘Beneficial Management Practice Adoption in Five Southern Ontario Watersheds’ (2009) 33(2) *Journal of Sustainable Agriculture*, 229.

*It is unlikely that there will be substantial new public funding for agriculture in Canada although it is clear that there is an interest in changing the existing safety net so that it is less geared toward funding greater production of commodities and more focused on helping medium and small-sized farmers through compensation for providing ecological goods and services.*³¹⁴

Property rights and rights to ES. Explicit rights in ecosystem services are not recognised in law in New York, England or Ontario, and the legal framework for PES does not enable the exchange of ES as a form of property. Rather, like the other examples, PES schemes under these legal frameworks function as an agreement relating to land use and conservation activities, not a transaction that commoditizes units of ES. The concept of ES has not permeated the law to the same degree in New York, England or Ontario as compared with the Latin American jurisdictions considered in Chapters 4 and 5, where there is explicit recognition of the public interest in ES, and the responsibility of government to manage ES in the public interest. Constitutional rights to property were important in framing the allocation of rights and responsible with respect to the environment in the New York example, and limited the legal ability of governments to restrict rights for environmental protection purposes.³¹⁵ While the New York case resulted in a negotiated solution, this is an evolving area of law in the United States, and some scholars have pointed to the potential for the ES concept to be applied by courts to interpret property rights more narrowly, by restricting rights in order to protect ES.³¹⁶

Policy integration. One of the challenges in legal frameworks where there is less government leadership of PES is greater difficulty in achieving integrated management. In the case of New York, the NGO intermediary has strategically integrated in the scheme with broader federal and state level grant programs, effectively leveraging different sources of funds. The large size of New York City, and the large scale of its water supply system and catchment area, is also more conducive to landscape-level coordination of PES as compared to smaller municipalities.

In England, the Defra *Action Plan* and the pilot studies also point to emerging applications of PES in a wider set of contexts relating to water, including: constructing wetlands to deal with wastewater discharges; investing in restoration and protection of moors to enhance natural water storage; and natural infrastructure (such as vegetation buffers) to address nutrient pollution from

³¹⁴ *ibid.*

³¹⁵ Pires *supra* (n 8).

³¹⁶ Ruhl JB, SE Kraft and CL Lant, *The law and policy of ecosystem services* (Island Press 2007).

urban development.³¹⁷ However, an environmental policy NGO has also noted that catchment scale action is hindered by no single organisation or government agency being able, or willing, to take on the responsibility and costs for area-based water quality and flood management.³¹⁸ There may be potential to bundle payments for land management practices that deliver multiple complementary ecosystem services, such as both natural filtration and flood risk management. However, institutional arrangements are not currently in place to provide the level of coordination and administration that would be required to manage land in a holistic way with regard to multiple ecosystem services. The PES pilot studies also highlighted the potential benefits of linking PES with existing conservation or agri-environmental incentive schemes.³¹⁹

In Ontario, there are several different types of programmes with similar objectives that offer incentives to land owners, however there is a lack of coordination both in terms of pooling funding sources and targeting priority areas for protection. Typically, the demand for existing programs had not been fully met by the funds available, and CAs and municipalities are constrained financially.³²⁰ At the same time, there are financial and administrative inefficiencies of federal, provincial and local governments all offering distinct funding programmes with overlapping objectives. Ontario provides a particularly good example of source water protection being integrated with the broader provincial planning framework, and watershed-level plans are nested within a provincial strategy for drinking water. This would provide a nested framework for locally-administered PES, if PES were to be further developed in this context.

³¹⁷ Defra supra (n 146).

³¹⁸ Francis supra (n 296).

³¹⁹ Defra supra (n 146).

³²⁰ de Loë, Kreutzwiser and Neufeld supra (n 201).

CHAPTER 7: CONCLUSIONS

Approaches to legal frameworks for payments for ecosystem services. The ES concept remains in early stages in terms permeating the law, and the legal frameworks for PES examined in this thesis provide leading examples of laws explicitly reflecting the ES concept. The examples of legal frameworks explored in this thesis show an increasing trend in law dealing directly with PES. This trend will likely continue as part of broader efforts to better account for the economic value of ecosystem services in natural resource management and sustainable development planning. This thesis has identified three broad categories of legal frameworks for PES, representing different approaches to addressing PES in the law depending on different policy objectives.

Legal frameworks establishing state-run PES represent the highest degree of intervention by government, given that the government creates and operates the scheme itself. State-run schemes are generally established in law (although they may operate under government policy without a specific legal basis). The legal framework generally determines almost every aspect of PES design and administration, including the ecosystem services targeted and who is eligible to participate. Generally, a centralized fund is established and a designated government agency is mandated to allocate payments according to prescribed criteria. The Costa Rican example is notable as one of the best-established national PES programmes, it is supported by a substantial body of rules, and is one of earliest applications of ES in legislation. Ecuador has also developed a comprehensive set of rules to support its national PES programme, and is notable as the only jurisdiction in the world to address “ecosystem services” explicitly in its national constitution.

The introduction of specific laws to regulate PES is a recent and novel development in environmental law. This type of legal framework does not establish a PES scheme itself, but rather creates a regulatory framework for PES, authorizing and promoting voluntary, decentralized development of PES within regulatory limits. The law establishes central government oversight over PES schemes, which may be operated and funded by local or regional governments or by private parties. It sets out the responsibilities of designated agencies with respect to PES, and may also require the maintenance of a central public registry of PES agreements. It also typically provides enabling authorities to authorize public entities to enter into PES agreements and to permit the use of public funds towards PES. The legislation may elaborate rules on PES participants, PES design and terms of payment, or provide regulatory authorities for the development of such

rules. Peru and Colombia have become leading jurisdictions in establishing this type of legal framework. The Peruvian law has the broadest application, establishing national jurisdiction to regulate all PES in the country, whether publically or privately funded and operated. The Colombian law provides national regulatory oversight over municipal and regional governments that develop PES schemes with private landowners for source water protection.

The examples of 'enabling' legal frameworks are characterised by a lower level of legislative guidance for PES compared to the examples of 'regulating' and 'establishing' legal regimes. More aspects of PES design and administration are determined at the level of PES agreements, rather than being set out in the general law. However, these enabling legal frameworks still influence the development of PES in important ways without stand-alone laws that establish or regulate PES. These legal frameworks address the design and administration of PES in different ways. New York City operates one of the most well-established and most cited examples of PES globally, to protect drinking water sources in the Catskills watershed. Features of federal U.S. law enable this scheme, within the context of allowing flexible means of compliance with regulatory requirements for protecting drinking water sources. England has some emerging examples of PES led by water service providers, with an enabling legal and policy context and specific regulatory reforms to encourage uptake of PES. Ontario is notable for its comprehensive legal framework addressing the protection of drinking water sources, which specifically enables PES at the local level, while such schemes have been slow to develop in practice.

Cross-cutting issues on the role of law in PES design and administration. Previous research has identified that a major limiting factor in the implementation of PES is that ES users and providers are unlikely to self-organise. This may be partly due to lack of awareness about ES provision, as well as high transaction costs involved in the design and implementation of PES that may deter parties from pursuing agreements, and also limit the scaling up of existing schemes. A critical way in which legal frameworks can support PES is through the creation of institutions to bring parties together, and the designation of roles and responsibilities to streamline PES implementation, which reduces transaction costs. Even when private ES users are willing to fund PES, the involvement of government or another intermediary is almost always needed to organize and facilitate relationships. A legal framework can enable public bodies to undertake this role in administering PES, and provide a means for pooling funds from public and private actors.

This is demonstrated in different ways in each of the case studies examined, and trade-offs between the reduction of transaction costs and the tailored design of PES to local conditions can be observed. In the cases of national schemes implemented by Costa Rica and Ecuador, for example, transaction costs are greatly reduced by applying the scheme uniformly according to a set of rules that apply nationally and by using standardised contracts. This comes at the expense of more nuanced incentives that could provide greater efficiencies and additionality at the level of specific agreements, and possibly at the expense of responding to local priorities. Responsiveness to local conditions is partially addressed by the creation of regional government bodies and partnerships with NGOs in the implementation of agreements at the local level. On the other hand, the national schemes have the greatest potential to implement integrated schemes that meet broader policy goals, and to pool the broadest range of funds, which can be accessed to protect a range of ecosystems across the country, in accordance with national priorities.

In the case of Peru and Colombia, a more nested model is applied, where nationally-applicable rules provide guidance on priorities and allow for coordination, but more details are left up to determination in specific PES agreements. This entails somewhat higher transaction costs in the negotiation of agreements, but the legal frameworks overcome critical hurdles by bringing parties together, identifying ES relationships, and providing guidance on the substance of agreements. In the case of New York, the legal framework relating to watershed protection and drinking water treatment provides only a loose basis on which to form PES. The establishment of the scheme represented a significant innovation, and initially high transaction costs were involved in negotiating the overarching framework for PES in the Memorandum of Agreement (MOA). Following the MOA, transaction costs for maintaining the scheme are relatively low through the use of standardised procedures and templates. Similarly in England, the legal framework provided a loose basis within which to organise *Upstream Thinking*, and required significant initiative on the part of NGOs in partnership with the water company. In Ontario, the legal framework provides a strong institutional framework for organising watershed-based PES, but these institutions have focussed on implementing other types of tools. In the case of all PES to protect drinking water, transaction costs can be reduced by utilising existing, relatively strong, institutions and funding relationships for water service provision.

The potential role of law in securing a long-term funding source for PES is also significant. For state-run schemes, generally, a centralized fund is established with contributions from general

government revenues. The Costa Rica example demonstrates how this model is not necessarily wholly reliant on government funds, but can be used to pool different sources of funds towards a common purpose. The examples in Peru and Colombia also provide an example of laws requiring that a small portion of water fees be directed to the protection of watersheds, which has the potential to motivate the uptake of PES. In the case of enabling frameworks, the development of PES is more reliant on demand for ES being generated without government intervention, which will be the case in more limited circumstances. Across different types of legal frameworks, it is possible for laws to establish user fees, charges or taxes on ES users or activities that have a role in degrading ecosystems, and direct these as dedicated funding sources for PES. In this way, instruments designed on the basis of the polluter pays principle may be implemented in tandem with PES to reward stewardship. As the case studies explored in this thesis have demonstrated, the potential to direct even a small part of water fees and infrastructure spending for water towards nature-based solutions has the potential to support watershed protection and a range of related ES.

Environmental standards can also drive PES development if they allow flexible options for compliance, as is the case in New York and England. Supportive policies can provide guidance and funding for PES programmes' start-up, and law and policy reform can remove barriers to PES. Supportive policies can provide technical support and guidance on best practices for designing PES. Across the different types of legal frameworks, a facilitative role is created for government bodies, also complemented by NGOs, in supporting ES science and technical issues.

Rules around how PES funding is allocated, how participants are selected, and how ES is targeted can promote fairness, transparency and accountability. This is an important role of the law in each of the case studies examined; these types of rules are most significant in the case of state-run schemes, and is also a significant feature of Peru's legally mandated PES registry. In the case of enabling frameworks as well, the framing of PES within the existing structure of laws for watershed management and water service provision contributes to transparency about the objectives of PES, and accountability in how PES contributes to the broader objectives of these regimes.

An appropriate legal framework can also encourage participation by providing certainty and clarity. Legislation can be used to create or enable a specific entity to lead or participate in PES. Legal frameworks might establish a mandate for national (or state or provincial) governments to undertake PES, or might direct or enable local governments or other public bodies or regulated entities to undertake PES. This might be critical to enabling PES, for example, where there is

uncertainty about whether PES is within the scope of the mandate and spending rules for government agencies or regulated entities such as water utilities. This has been a critical feature of both the regulating and enabling legal frameworks. Previous research has also recommended a nested approach to PES, where communities and local and regional governments are engaged in project design and implementation, within a national framework that provides guidance. Such an approach is consistent with both the regulating and enabling legal frameworks.

For the purposes of evaluating legal frameworks for PES in the case studies, this thesis considered only PES schemes that entail direct payments based on an explicit agreement. The legal frameworks do not recognise units of ES for trading, or support the commodification of ES. While the considerations for credit-based trading schemes may be different, there does not appear to be any advantage to the commoditization of PES in the context of direct payment agreements. On the contrary, there may be risks to doing so, and the implementation of PES is better considered from a broader policy perspective.

In each of the cases studies considered, payments are designed to be conditional on land management activities such as retention of natural forests, ecosystem restoration, or sustainable agricultural practices (inputs) as opposed to making payments conditional on the delivery of ES itself (outputs). While monitoring is important to understand the effectiveness of PES schemes, implementing comprehensive monitoring and a rigid accountability framework can be prohibitive at the level of individual agreements. In each of the case studies, while ES outputs are not assessed as a condition of contracts, there are broader government efforts to assess changes in ES on a wider scale. This approach is consistent with a more holistic, public interest view of additionality, where the positive contribution of the scheme as a whole to society is a more important measure than determining the contribution of each ES provider. The timeframe involved in securing ES is also relevant, where in some cases impacts on ES may not be fully observable until after the expiration of contracts. Agreements can be entered into based on the best available knowledge at the time, and there may be a need to adapt future contracts over the longer term based on later observations in the actual delivery of ES. In this way, the medium-term commitment provided by PES may be an advantage in adaptive management. A broader lens in assessing ES outputs is also consistent with the view that, to be sustainable over the long term, PES must focus on protection of underlying natural capital, rather than attempting to focus narrowly on the flows of a particular ES in isolation.

Legal frameworks can also affect the design of PES to ensure that PES contributes towards higher-level strategies for ecosystem services. This function of the law can also be understood in terms of the state representing the public interest in ecosystem services, which is in some cases bolstered by constitutional rights and duties. Laws for PES can set criteria for prioritizing areas to target for payments based on ES provision, identify the stakeholders that benefit from ES provision, and make links to broader regimes for environmental protection, natural resource management and conservation. The law can set out all contract terms and conditions, as is typically the case for state-run schemes. PES-specific laws can also set out a process for integrating national, regional and local planning for PES and also require that PES contracts include certain elements. Nested frameworks can also integrate PES with land use planning from a landscape perspective, taking into account broader considerations and goals.

PES in context. The ES concept has widely influenced environmental and sustainable development policy, in particular since the UN Millennium Ecosystem Assessment in 2005. While ES is not a panacea for achieving sustainability, ES-based approaches have a number of advantages in confronting the ecological and economic development challenges facing modern society. One of the greatest strengths of ES-based approaches is expanding consideration of nature outside the bounds of the traditional environmental policy arenas. There is a growing realisation that problems traditionally considered to be unrelated to environmental policy are in truth strongly connected to the environment: ecosystems underlie issues spanning climate, energy, food, water, urban planning, human health, economic development, social justice, and national security. This opens the possibility for PES to gain traction across multiple sectors, and to direct new funds to ecosystem protection and restoration that would not previously have been available for this purpose.

There is nothing inherent in ES-based approaches that prioritizes certain ecosystem uses over others. ES analysis emphasizes ecosystem considerations that have traditionally been overlooked, but broader governance frameworks will direct how ES knowledge is utilized. There is reason for caution where specific ES are itemized and heavily prioritized over others. The need for holistic, integrated approaches, which has been more broadly identified in sustainable development, IWRM and biodiversity policy, remains true for ES-based approaches, including PES. The case studies of legal frameworks explored in this thesis demonstrate how PES may be integrated within broader frameworks in order to protect broader objectives for ES.

Payments for ecosystem services schemes are gaining momentum globally and are expected to increasingly complement command-and-control measures for environmental protection and conservation. The use of positive economic incentives can be effective and more efficient than other interventions, especially to support ecosystem protection and restoration on private land. However, it is important to acknowledge that many factors beyond economic motivations influence decisions about ecosystem use. PES is one policy tool among others within a broader policy and legal framework, and theorized economic models of PES are largely disconnected from implementation of PES in practice.

Much of the literature relating to PES is concerned with examining PES from the perspective of environmental economics and market theory, or on critiquing PES on the basis of weaknesses in market theory. Many authors have also identified the need for more attention to be paid to the institutional and governance setting for PES and the factors beyond economic motivations that influence decisions about ecosystem use. This thesis contributes to such an examination of how PES is situated within broader legal frameworks. The diverse case studies also demonstrate that PES does not presume a particular political or economic system, and can be applied in different ways across developing and developed country contexts. These examples demonstrate that PES is not best described as a market-alternative to government regulation, but rather as a tool that is deeply integrated with legal and regulatory frameworks and used to achieve public policy goals.

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