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Interrogating participatory catchment organisations: cases from Canada, New Zealand, Scotland and the Scottish–English Borderlands

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Catchment management in the developed world is undergoing a fundamental reconfiguration in which top-down governance is being challenged by local organisations promoting collaborative decisionmaking. Local, participation-based organisations are emerging as mediators of relations between governments and publics. These organisations, defined here as participatory catchment organisations (PCOs), are emergent at a time when developed world catchment management is itself undergoing substantial change. Through in-depth engagement with four PCOs, and using six case studies, we identify the principles associated with successful problem resolution. The findings illustrate the importance of PCOs as two-way bridges between publics and governments. We identify three principles shared by these organisations that show how, through participatory approaches founded on trust, complicated problems can be resolved in ways that do not unduly punish groups or individuals. In conclusion, we identify four questions that highlight the need to consider the practicality of evolving relations amongst governments, publics, and the organisations that have come to mediate catchment management.

KEY WORDS: catchment management, water, NGO, participation, problem, collaboration

Introduction: the changing nature of developed world catchment management

Catchment management in the developed world is undergoing fundamental change (Gooch 2005; Shrubsole 2007; du Toit and Pollard 2008; Fenemor *et al.* 2011b; Lane *et al.* 2011a; Cook and Spray 2012). In response to dissatisfaction with present forms of governance, new relations are being trialled and new actors emerging. In general, top-down, centralised and expert-led governance is being challenged by bottom-up, local management informed by a diverse range of knowledges (Oliver 2001; Mustafa 2002; Eden *et al.* 2006; Irwin 2006; Reed 2008; Fenemor *et al.* 2011a; Tseng and Penning-Rowell 2012). Whether rationalised as a means to devolve costs or as a way to empower local individuals, there appears to be consensus concerning ideal catchment management (i.e. toward local, collaborative approaches), but research exploring how this objective might be practiced remains abstract and generalised (for example, see Marshall *et al.* 2010). Broadly, analyses of these trends have been predominantly deductive in nature, testing pre-existing theory and hypotheses against changing governance. Furthermore, there has to date been only tentative engagement with the individuals and organisations who have come to shape catchment management. To complement existing research, we have conducted a more inductive analysis, using as our entry point a group of organisations – from similar yet international contexts – that have become integrated into catchment management due to histories of successful engagement with local problems.

In addition to discontent with top-down governance, the recent global economic downturn has inhibited traditional, capital-intensive governance through a reduction and/or reallocation of capital (Harvey 2010), which is acutely relevant to traditional forms of catchment management. Austerity aligns with pre-existing criticisms of technical management (Werritty 2006; Lane *et al.* 2011b), providing an economic rationale for individuals promoting alternative forms of catchment management. Of particular importance is the emergence of a 'governance gap', which has arisen as national governments disengage from management with the expectation that the public will assume responsibility for delivering the services that citizens have grown to expect. In this context, the number of 'third sector', 'non-governmental' and 'voluntary' organisations has, for some time, been increasing (Yearley 1996; Jepson 2005; Eden *et al.* 2006; Marshall *et al.* 2010; Cook *et al.* 2012). This situation is unsettling because governments appear to have retained the desire to determine policy while devolving costs and responsibility for implementation. As local organisations continue to fill the gap between publics and governments, then, questions arise concerning their obligations, policies and agendas.

To learn from the organisations filling the governance gap, this analysis draws upon in-depth engagements with organisations from Canada, New Zealand, Scotland and the Scottish-English Borderlands. In addition to a long-term engagement with four organisations, for this discussion we have elicited six case studies, each an unaltered description of successful problem resolution from those mediating public-governments interactions. In addition to identifying a distinct subset of non-governmental organisations (NGOs), we argue that these cases show three, entwined principles: to develop trust as an intermediary between publics and governments; to encourage collaborative decisionmaking by including all vested parties; and to challenge the presumed need for losers by seeking win-wins. Rather than stating the obvious, the cases show how the organisations put these principles into practice. We begin this paper with a discussion of our methodology, before exploring the case studies (see Table 1). We then present results, which have been condensed in Table 2. In the discussion, we explore the three principles before concluding with four questions concerning what is, we argue, an ongoing reconceptualisation of the public-governments interface in the context of developed world catchment management. In terms of wider relevance, we believe that the growing number of organisations that fit the participatory catchment organisation (PCO) definition (see generally Marshall *et al.* 2010; Cook *et al.* 2012) suggests a need to better understand their activities, particularly how they interpret success. Most importantly, if these organisations continue to mediate public-government relations, then there is a significant but underexplored redistribution of power underway.

Methodology: catchment management organisations and representatives

This research explores successful catchment management by enabling those dealing with problems to identify what is important (knowledge exchange one), and to then relate those issues to the wider discourse (knowledge exchange two). The case studies allow for contrast and comparison across international contexts while simultaneously linking these organisations to the wider emergence of non-governmental actors (Reed 2008; Marshall *et al.* 2010; Allen *et al.* 2011; Cook *et al.* 2012; Penning-Rowell and Pardoe 2012). The ascendancy of local, collaborative decisionmaking demands consideration of actors' experiences. Members of the catchment organisations have provided the case studies in response to a request for 'an example of your organisation's successes'. This reflexive view addresses a desire from amongst these organisations to share their experiences with individuals looking to become involved in catchment management. We have included the case studies in an unaltered form, with only minor typographic changes

Table 1 Physical and social characteristics of case studies

	Physical characteristics of catchment			Social characteristics of catchment	
	Size	Topography	Climate	Urban-rural	Economy and water
River Dee Catchment Partnership	2100 km ² The main stem of the river is 126 km, with 17 major tributaries	The catchment consists of two geographically distinct regions: the Western half of the catchment is predominantly upland while the Eastern half is lowland. 60% of the catchment is over 300 m in altitude	Annual average precipitation ranges from 2100 mm in the Cairngorms to 810 mm at Aberdeen The region has a cool temperate climate with an annual mean temperature of 8°C	The majority of the catchment's human population are concentrated in the city of Aberdeen	Water is used to supply urban centres and to support light industry and agriculture
Fraser Basin Council	240 000 km ² The main stem of the river is 1399 km, with 40 major tributaries	The catchment consists of 13 main watersheds, spanning from the Rocky Mountains to the Pacific Ocean It includes five climatic zones, including alpine tundra, grasslands, temperate rain forest, and lowland valley	The climate of the Fraser Basin is highly variable both spatially and seasonally. Average annual temperature is 4°C in the upper watershed (Prince George) and 10°C at the mouth of the river (Vancouver) Average annual precipitation is 279 mm in the central watershed (Kamloops) and 1200 mm in Vancouver	The majority of the catchment's human inhabitants (2.3 million of 3 million) are concentrated in the region of Metro Vancouver	The Basin contributes to 80% of the provincial economy, including 21 million ha of forest, half of the province's agricultural land, eight major mines accounting for 60% of the province's production Approximately 67% of tourism revenue comes from the catchment
Motueka Landcare (New Zealand Fish & Game)	2200 km ² The main stem of the river is 110 km, with 17 major tributaries	Flat alluvial plains at sea-level with young, relatively fertile soils Rolling and steep hill country in lower basin with low-fertility soils Flat alluvial terraces in upper basin valleys with young relatively fertile soils Rugged mountainous terrain in headwaters, ranging from thin-infertile to thick fertile	The climate is cool and humid with distinct wet and a dry (austral summer) seasons Average annual precipitation ranges from 1000 mm in the east to more than 4000 mm in the western headwaters	The catchment population of 12 000 equals less than 1 person per km ² with the biggest town being Motueka, on the coast	The Motueka River supports an internationally renowned brown trout fishery and tourism Nationally significant scallop and cockle fisheries in Tasman Bay complement rapidly expanding mussel aquaculture Horticultural irrigation of hops, apples, kiwifruit and berries The Salmon fishing on Tweed contributes around £18 million per year to the local economy and supports over 500 jobs Combined with the stunning scenery and the rich built and cultural heritage, tourism is one of the mainstays of the region's economy
Tweed Forum	5000 km ² The main stem of the river is 156 km, with 11 major tributaries	Bounded to the North and West by the Lammemoor and Moorfoot Hills, to the South by part of Northumberland National Park These upland areas are dominated by sheep farming and forestry and characterised by bare, rounded hills with steep valleys or cleuchs The lower reaches flow through productive arable land	Cool temperate climate High rainfall in the Western headwaters Many of the Eastern tributaries often suffer from low flows in the summer	The Tweed catchment is predominantly rural, ~150 000 people The biggest towns are Berwick upon Tweed, Galashiels (12 000) and Hawick (13 000)	

Table 2 Characteristics of catchment organisations

	Origins	Mandate/approach	Funding	Relationship with government	Challenges
1	Dee Partnership	To promote, support, and undertake fully integrated management and planning in the River Dee catchment	DCP core funding comes from seven statutory and non-statutory organisations	The Scottish Government Rural Payments and Inspections Directorate on Steering Group	Agricultural and urban pollution and morphological alterations
2		Using strategic planning, project delivery and awareness raising, we are working to protect, enhance and restore the waters of the River Dee catchment	In kind support from all partner organisations through staff representation on steering, management and project groups	Has no statute, but works closely with the Scottish Government, and its agencies	Growing population pressures and demand for housing
3			In kind support in form of specific skills, data and advice provided as required.	Mediator between government agencies and water managers	Habitat protection for protected species
4	Fraser Basin Council	To ensure that decisionmaking will protect and advance its future social, economic and environmental sustainability	Most of the Fraser Basin Council's funding is project based. Funds are received from government, non-government and private sector organizations to support the Council in the delivery of sustainability programs, projects and initiatives in partnership with others	Federal, provincial, municipal, and First Nations governments are all represented on the Council's Board of Directors	Supporting organisational stability by maintaining funding security
5		To bring together government, private sector, and non-government partners to find enduring, workable solutions to many complex sustainability challenges	Funding is also received from regional districts located within the Fraser Basin	There is also diverse government involvement in the various programs, projects and initiatives of the Council	Supporting organisational stability by maintaining funding security
6		Take advantage of opportunities to enhance the sustainability of the Basin			Supporting organisational stability by maintaining funding security
7		In some cases resolve entrenched conflicts			Supporting organisational stability by maintaining funding security
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25					Supporting organisational stability by maintaining funding security
26	Motueka Landcare (New Zealand Fish & Game)	To conduct multi-disciplinary, multi-stakeholder research to provide information and knowledge that will improve the management of land, freshwater, and near-coastal environments in catchments with multiple, interacting, and potentially conflicting land uses	Funded through national research grants and co-funding from Tasman District Council, farm and aquaculture groups, Ministry of Agriculture and Forestry, Maori and local groups	A national case study to learn about good practice (CM, including collaborative, devolved and integrated governance of land, water and coasts	Growing population pressure, with a 20-year projected population of approximately 4 million
27		The goal is an innovative combination of historical research, biophysical experimentation, simulation modelling, and social learning	Ongoing support provided by Tasman District Council, through the NZ Landcare Trust, research and stakeholder groups	There is also diverse government involvement in the various programs, projects and initiatives of the Council	Urbanisation
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47					Urbanisation

1 for consistency and space. Overall, the case studies
2 provide an opportunity to consider the potential
3 themes running through participatory catchment man-
4 agement, as perceived by these actors.

6 *The organisations*

7 The respondents are members of four organisations
8 from three developed world, Anglophone and temper-
9 ate regions: the River Dee Catchment Partnership
10 (Scotland), the Fraser Basin Council (FBC; west coast
11 of Canada), the Motueka Integrated Catchment Man-
12 agement Group (New Zealand), and Tweed Forum
13 (Scottish–English Borderlands). While we have chosen
14 to contrast the experiences of individuals and organi-
15 sations from similar contexts, we recognise that catch-
16 ments, populations, cultures, economies and histories
17 differ and produce heterogeneous examples. Despite
18 differences, our desire to contribute experiential and
19 empirical findings necessitates a degree of generalisa-
20 tion across these locations. We argue that, in terms of
21 real world examples, these cases describe similar
22 organisations dealing with similar problems in similar
23 contexts; ideally, then, the findings will have rele-
24 vance outside these individual cases (Yin 2003). In
25 terms of their make-up, the organisations draw
26 together a diverse range of participants. For example,
27 the Sherry River Catchment Group includes all of the
28 farming families of a subcatchment of the Motueka
29 River; the group has been supported by the Landcare
30 Trust and therefore has been able to apply for com-
31 munity funding through central government's Sustain-
32 able Farming Fund. Alternatively, the FBC's board is
33 made up of 38 directors, including federal, provincial,
34 local and First Nations representatives. In addition,
35 the private sector and civil society are represented.
36 The primary motivation is thought to be the advance-
37 ment of sustainability in the Fraser Basin. Other moti-
38 vations include supporting dialogue and sharing
39 perspectives at a safe table, as well as opportunities to
40 strengthen bilateral relations with other members. For
41 Tweed Forum, participation is, similarly, motivated for
42 a variety of reasons, which include the desire to share
43 knowledge and resources; achieve efficiencies (in
44 time and money); work in a smarter, joined up way;
45 and perhaps, most importantly, to bring about mean-
46 ingful changes on the ground that help meet their own
47 strategic objectives.

48 The organisations were chosen as a result of prior
49 engagement with the FBC and Tweed Forum, which are
50 involved in numerous research projects exploring
51 physical and social aspects of catchment management.
52 Tweed Forum's nationally recognised successes, and
53 the Scottish Government's interest in replicating the
54 organisation's operations and governance structure,
55 led to discussions concerning 'what makes Tweed
56 Forum successful', which in turn led us to seek addi-
57 tional, international examples of similar organisations
58 successfully addressing catchment management chal-

59 lenges. Given Tweed Forum's networks, the other
60 organisations were analysed, then contacted.

61 The organisations, which range from formal to a
62 notional group of interested parties with a common
63 purpose, share many traits (see Table 1), but none
64 more significant than the desire to encourage collabo-
65 rative decisionmaking based on negotiation amongst
66 all parties active within catchments. This is, in effect,
67 how the organisations interpret 'success' and reflects
68 how they develop policy and engage with local prob-
69 lems. While each of the four catchments is unique,
70 and while the physical and social characteristics vary,
71 the problems shaping each organisation appear to be
72 highly alike. A critical similarity amongst these organi-
73 sations is their interpretation of success. For example,
74 the Tweed Forum interprets success as:

75 working in partnership to achieve integrated catchment
76 management with an emphasis on achieving changes on
77 the ground that deliver multiple benefits.

78 Executive 1 (22 June 2012)

79 Similarly, a program manager from the FBC:

80 interprets success in terms of advancing and improving
81 the status of sustainability on the ground (i.e. improved
82 water quality, healthier fish stocks, resolution of specific
83 conflicts). In some cases we also interpret success in
84 terms of good process (i.e. meaningful engagement with
85 communities, stakeholders, and First Nations; decision
86 making that is informed by science and other forms of
87 knowledge; collaboration; etc.). Ideally, we would look
88 for correlations between good processes and successful
89 outcomes on the ground.

90 Program Manager 1 (13 July 2012)

91 Finally, an executive from the Motueka Landcare
92 group lists several traits that echo the previous
93 comments:

- 94 • the whole catchment community recognises their
95 land and water management affects everyone else;
- 96 • a strong knowledge base created for catchment
97 planning for decades to come;
- 98 • recognition that catchments extend offshore;
- 99 • stakeholders now committed to working together
100 because the Motueka is a special place (Executive
101 2, 2 July 2012).

102 Overall, the organisations share an understanding of
103 success based on local partnership, conflict resolu-
104 tion, trade-offs, and positive change; their overarching
105 aim, too, is linked to sustainability and equality
106 amongst diverse users.

107 *The participants*

108 Dialogue with and between these organisations
109 began in September 2010, leading to a weeklong
110

1 knowledge exchange in May 2011 and a follow-on
2 meeting in October 2011. The knowledge exchanges
3 provided an unusual opportunity for these organisa-
4 tions, as they were said to rarely have the time to
5 consider their role(s) within wider governance or to
6 spend extended periods developing ideas and/or net-
7 works. The connection of national networks, in par-
8 ticular, has enabled further knowledge transfer. The
9 two exchanges were divided into exploratory and
10 assessment phases, with the former providing an
11 opportunity to compare and contrast experiences,
12 challenges and systems of management and the latter
13 providing the opportunity to discuss questions arising
14 from that exchange and to critique the findings. In
15 addition, this process and subsequent communica-
16 tion included engagement with three types of repre-
17 sentatives: an executive, a programme officer, and an
18 individual responsible for public engagement – in
19 one case a single individual was responsible for both
20 programme management and public engagement.
21 The inclusion of three 'layers' is original and is inte-
22 gral to understanding the scales at which these
23 organisations operate. The exchanges were con-
24 ceived and organised collaboratively, with partici-
25 pants responsible for ensuring the topics, themes and
26 questions were relevant to their operations. This was
27 accomplished using email, in which the organisers
28 elicited suggestions, which were then presented to
29 the group for comment and amendment.

30
31 **Case studies: examples of successful, participatory**
32 **catchment management**

33 *Dee Partnership: Beginning a collaborative venture*
34 *(northeast Scotland)*

35 The Tarland Catchment in northeast Scotland sup-
36 ports a wide range of land uses. Pressures from agri-
37 culture and from housing development influence
38 management. As a result, water quality, aquatic and
39 riparian habitat in the catchment are degraded,
40 prompting concerns regarding suspended sediments,
41 phosphorus, nitrates, coliforms and poor instream
42 habitats.

43 The ongoing Tarland Catchment Initiative (TCI)
44 began in 2007 as a local project, supporting sustain-
45 able solutions and integrated approaches to land man-
46 agement. The project has three aims: to improve
47 awareness of issues relating to local water quality; to
48 implement stream improvements to alter practices
49 detrimental to water quality or habitat; and to assess
50 the efficiency and benefits of such actions.

51 The TCI, part of the Dee Catchment Management
52 Plan, is being taken forward by the James Hutton
53 Institute, which is a government-financed research
54 organisation, working in close association with
55 various government agencies and the main land-
56 owner, the MacRobert Trust. The TCI has:

1. Installed a wetland to improve treatment of water released by the local sewage works, improving water quality and providing habitat for wading birds. 57
2. Monitored diffuse pollution, exploring how it might be reduced. 58
3. Installed buffer strips, reducing diffuse pollution from agricultural fields and reducing soil erosion and faecal contamination associated with cattle. The buffer strips have also provided bankside habitat. 59
4. Established small wetlands to provide a variety of habitat, improving water quality and flood management. 60
5. Trialled different types of watering for cattle, providing an alternative to highly pollutive in-stream practices. 61
6. Worked with community members, farmers, and schools, raising awareness of diffuse pollution. 62

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Both the community and individual stakeholder groups have benefited from the TCI. As well as the intended improvements in environmental quality and landscape enhancement, the community has taken ownership of the buffer strips, creating a network of footpaths which are maintained and promoted as local recreational venues. The community has also initiated the installation of a small pond to reduce local flooding, and erected a hide for wildlife viewing. In terms of benefits, the agencies responsible for water quality and biodiversity achieved substantial improvements, including Scottish Water, who benefited from secondary treatment of its wastewater. The catchment's fisheries also benefited, contributing to an unexpectedly quick return of salmon to watercourses from which they had been absent for many decades. The catchment's land managers won grants for improvement measures, benefited from improved on-farm facilities, achieved compliance with regulation, and added to their understanding of the water environment, including access to a live website showing stream conditions. The scientists involved in the TCI strengthened their understanding of the socio-natural environment and initiated a long-term research platform. Finally, the wider Dee Catchment Management Plan (Cooksley 2007) will continue to benefit from knowledge gained from the demonstration sites.

105 *The FBC: Using collaborative and integrated*
106 *approaches to manage invasive plants*
107 *(British Columbia, Canada)*

108 The FBC has facilitated participatory, collaborative
109 processes and initiatives throughout the Fraser River
110 Basin in British Columbia (BC), Canada for about 15
111 years. In 2001 the FBC Board of Directors decided to
112 tackle the 'thorny' issue of invasive plants. This was a

1 pressing sustainability concern, with social, economic
 2 and ecological consequences.

3 Invasive plants have a significant impact on the
 4 region's environment and economy. They replace
 5 native species and decrease biodiversity. On BC's
 6 agricultural lands, they reduce crop yields by an
 7 average of 10–15%. A 2005 study showed that spotted
 8 and diffuse knapweed (*Centaurea maculosa* and
 9 *Centaurea diffusa*) could reduce cattle forage by up to
 10 90%. The calculated cost to ranchers of this one
 11 species was \$400 000 per year, a loss that could
 12 exceed \$13 million per year should knapweed spread
 13 to the limits of its range. The introduction and spread
 14 of invasive plants happens on multiple fronts, such as
 15 travel and trade; horticulture and gardening; transpor-
 16 tation and utility corridors; seed mixtures; recreation;
 17 and through the passage of livestock, wildlife, people
 18 and pets.

19 In 2002, the FBC hosted a meeting of federal, pro-
 20 vincial, local and First Nations government repre-
 21 sentatives, along with those from NGOs and industry.
 22 Their collective efforts led to an Invasive Plant Strategy
 23 for BC (FBC 2003), featuring an action plan to address
 24 invasive plant populations throughout the province.

25 The FBC recognised early that a long-term commit-
 26 ment to collaborative efforts would be required to
 27 tackle the challenge. In 2005 the Invasive Plant
 28 Council (IPC) of British Columbia was created as a
 29 registered non-profit society to advance the imple-
 30 mentation of the Invasive Plant Strategy. The IPC is an
 31 independent body with a consensus-based board
 32 representing various sectors and regions, modelled
 33 closely on the FBC's governance structure. The IPC
 34 Board and broader membership include representa-
 35 tives from all orders of government, NGOs, land and
 36 water-based user groups, resource-based businesses,
 37 and industries and utilities.

38 The IPC works to minimise the negative ecological,
 39 social and economic impacts caused by the introduc-
 40 tion, establishment and spread of invasive plants. It
 41 does this by increasing public awareness; securing
 42 long-term, stable funding for invasive plant manage-
 43 ment; reviewing current legislation on invasive
 44 species to find areas needing attention; building link-
 45 ages among current invasive plant inventories and
 46 databases; and identifying and promoting coordinated
 47 research on invasive plant management.

48 There was an important early role for the FBC to
 49 serve as a catalyst for action on the issue of invasive
 50 plants. The FBC facilitated the development of a pro-
 51 vincial invasive plants strategy and a memorandum of
 52 support designed to encourage people in different
 53 regions and sectors to become active in their own
 54 fields and to work collaboratively.

55 The IPC now has a large (and growing) circle of
 56 members. They include technical specialists working
 57 for government and industry, weed committee coordi-
 58 nators, First Nations representatives, foresters, forest
 59 technologists, biologists, ranchers, horticulturists,

recreation enthusiasts, gardeners and other concerned
 individuals. Over 1000 individuals and 300 organisa-
 tions have signed the IPC memorandum of support
 and joined the effort. In its first 5 years, the IPC has
 helped to establish and support local invasive plant
 committees across BC. The IPC has become a key
 resource organisation on invasive plants for all those
 working 'on the ground' in multiple sectors and juris-
 dictions, offering information and resources tailored
 for different audiences (from local government deci-
 sionmakers to forestry workers, landscapers and home
 gardeners). Taking a fresh collaborative approach may
 be daunting, but it is an investment that brings out the
 best in people and leads to the multiplication of long-
 term benefits.

*Motueka ICM Group: Water Augmentation
 Committee (Waimea, New Zealand)*

The 722 km² Waimea River catchment lies west of
 Richmond and Nelson City, New Zealand. The
 Waimea plains support a diverse range of intensive
 horticulture and cropping. Some pastoral farming and
 plantation forestry occurs in the hill country and native
 forest in the river headwaters. The river is locally valued
 as a recreational resource for swimming, fishing, jet
 boating and kayaking and provides habitat for fish and
 birds. Some 3700 ha of the plains are irrigated, mostly
 from shallow groundwater. However, the groundwater
 pumping induces the Waimea River to periodically run
 dry, failing its target minimum flow of 225 l/s on the
 plains despite a natural annual low flow above the
 plains of 2200 l/s. The security of supply for irrigators is
 correspondingly low, with water use restrictions
 required in seven of the last nine years, yet insufficient
 to keep the flow consistently above the 225 l/s target. A
 further 1500 ha of the plains could be irrigated if water
 was available, as well as providing for future urban and
 industrial use.

Rather than litigate, risking even more restrictions
 on water use, the parties dependant on the river
 agreed in 2003 to seek a collective solution. A com-
 mittee representing all stakeholders has since investi-
 gated water storage options with the aim of providing
 both an adequate flow for the ecological health of the
 river and to meet all present and future abstractive
 needs on a hundred year horizon. A variety of tasks
 have been undertaken, including:

- assessment of environmental, cultural, and out-of-
 stream flow and water quality requirements;
- over 20 dam sites and out-of-catchment water aug-
 mentation options considered;
- likely land uses, urban growth and water require-
 ments assessed;
- groundwater and flow regime models updated and
 water quality modelling undertaken; and
- costing and governance options debated.

1 Funding for these tasks has come from a partnership,
2 including central and local governments, irrigators
3 and environmental interests. A dam in an upper tribu-
4 tary to augment natural river flows during dry periods
5 is the most likely outcome, funded from these same
6 sources. This dam is in the final stage of planning. The
7 committee is an independent group of the affected
8 parties, supported by the local authority as project
9 manager.

10 The project has now been recognised as a leading
11 example in New Zealand of collaboration between
12 initially competing parties. In particular, a recent
13 review of the project has found that the 'community
14 nature' of the scheme is more likely to resolve difficult
15 issues such as land acquisition. Communication with
16 and frequent surveys of various parts of the commu-
17 nity have been key features to ensure community
18 'buy-in' to the project.

19
20 *Motueka ICM Group: Supporting voluntary action to*
21 *restore water quality for swimming (Sherry River,*
22 *New Zealand)*

23 New Zealand farmers produce milk, meat, wool,
24 timber and related products with minimal government
25 support for environmental protection. This case study
26 explored the factors that can motivate voluntary
27 action by catchment landowners to improve water
28 quality. It is part of a wider research programme on
29 integrated catchment management (ICM) carried out
30 in the 2170 km² Motueka catchment.

31 Early in the ICM research programme, a two-year
32 study of water quality across the Motueka catchment
33 and its tributaries (Davies-Colley *et al.* 2004) showed
34 that the 78 km² Sherry River subcatchment had high
35 levels of bacterial contamination, indicating the river
36 was unsafe for swimming in its lower reaches.

37 The water quality results were discussed with a
38 Community Reference Group, which was set up as a
39 sounding board for the ICM project. They passed this
40 new knowledge through their community networks,
41 which became concerned that farming was being
42 blamed. The NZ Landcare Trust, an organisation
43 working at the interface between farmers and govern-
44 ment, responded by convening a 'kitchen meeting' of
45 researchers and the eight major landowners in the
46 catchment to discuss the water quality results – espe-
47 cially as they and their families enjoyed swimming in
48 the river.

49 It was the combination of science and facilitation of
50 dialogue that galvanised the farmers into action. What
51 was causing the problem and what could be done to
52 fix it? They formed the Sherry River Catchment Group
53 and asked the researchers to get to the cause of the
54 problem. In a collaborative exercise with a local dairy
55 farmer, researchers monitored changes in water
56 quality as the herd crossed the stream. *Escherichia coli*
57 levels reached up to 50 000 cfu/100 ml in the Sherry
58 when 246 cows crossed the river, effectively quadru-

59 pling the daily load of faecal bacteria in the river
60 (Davies-Colley *et al.* 2004). The herd crossing also
61 elevated suspended solids and total nitrogen. The
62 work showed cows were 50 times more likely to
63 defecate in water than elsewhere on the raceway.

64 Importantly, the farmers accepted the results as they
65 had asked the questions. In response, over a two-year
66 period, four stock-crossing bridges have been funded
67 and built by farmers, replacing all former river fords.
68 The installation of bridges has been facilitated through
69 the NZ Landcare Trust and supported by the Tasman
70 District Council through the waiver of the normal fees
71 for building consent. At a cost per bridge of up to NZ
72 \$50 000, the farmers have made this investment not
73 simply because of the environmental benefits, but
74 because there are also benefits for stock health, faster
75 access to milking, ability to cross during floods, and
76 because industry-led regulations were likely to
77 require this action in future. The use of bridges has
78 resulted in about a 50% reduction in bacterial con-
79 centrations in the river.

80 Perhaps most importantly, the collaborative commu-
81 nity approach has created cohesion among the
82 Sherry landowners, researchers and agencies. The sci-
83 entists have also identified that other changes in farm
84 management will be needed to routinely meet later
85 swimming quality standards in the Sherry River. Land-
86 owners are determined to bring river water quality up
87 to swimming standards through bridging, culverting,
88 riparian management, and improved environmental
89 planning involving all land use types. They are now
90 implementing a programme of priority actions identi-
91 fied in their individual Landowner Environmental
92 Plans. When asked what factors would contribute to
93 their continued implementation of those priority
94 actions, a common theme was that 'having someone
95 show an interest' is vitally important for the long-term
96 success of the catchment group.

97
98 *Tweed Forum: Clean bathing waters, riparian*
99 *habitat restoration and happy farmers*
100 *(the Eye Water, Berwickshire)*

101 From its source in the eastern Lammermuir hills of
102 southeast Scotland, the Eye Water has a catchment
103 area of 120 km² and runs through rough grazing,
104 pasture and arable land, reaching the coast at Eyem-
105 outh. Eyemouth beach is designated a Bathing Water
106 under Directive 76/160/EEC and must comply with
107 EU water quality standards.

108 Rural diffuse pollution affects the Eyemouth bathing
109 water, with the potential to also affect designated
110 bathing waters at Pease Bay and Coldingham Bay. The
111 Eyemouth bathing water failed to meet mandatory
112 standards in 2005 and 2007. Diffuse pollution asso-
113 ciated with arable and livestock farming in the Eye
114 Water catchment contributed to this failure and
115 studies of faecal indicator organisms showed that
116 much of the origin was from a ruminant source (i.e.

1 livestock). The problem was exacerbated by short-
2 grazed and steep pastures, leading to situations in
3 which heavy rains washed sheep droppings directly
4 into the river. In addition, cattle tend to defecate while
5 standing and drinking in the river. The creation of
6 thickly vegetated buffer zones was required.

7 The Scottish Environment Protection Agency (SEPA)
8 approached Tweed Forum to help enlist farmers to
9 fence-off small streams in the upper catchment, par-
10 ticularly at 'hotspots' where sheep and cattle had
11 unrestricted access to the river for watering purposes.
12 Altering this practice carried significant financial
13 implications, with investment needed in fencing,
14 water pipes, water troughs and water pumps.

15 Tweed Forum approached 29 farmers identified by
16 SEPA and discussed various options, including
17 support for capital works. Eleven farmers participated,
18 with three farmers being signed up to the Scotland
19 Rural Development Programme with Tweed Forum
20 acting as an agent. Tweed Forum also applied to the
21 SEPA River Restoration Fund for a sum of £45 000 for
22 works carried out on 10 farms. Together with capital
23 from the Scottish Rural Development Programme, the
24 project spent £87 500 on works to protect the quality
25 of water in the Eye Water. The works included six new
26 water troughs, 12.7 km of livestock fencing, the pro-
27 tection of 7800 m of river (11.7 ha in area) and 500
28 native trees planted. This collaborative approach is
29 typical of Tweed Forum's work in subcatchments of
30 the Tweed River.

31 This case study shows that with detailed and sensi-
32 tive facilitation, farmers are able to protect the river,
33 create wildlife habitat, and continue farming without
34 fear of breaching regulations. To date, water quality at
35 Eyemouth Beach has improved, though not without
36 further difficulties and polluted waters.

37 *Tweed Forum: Wind farm and leveraging multiple* 38 *benefits (Scottish-English Borderlands)*

39 In the Scottish Borderlands, since 2009, funding from
40 wind farm mitigation measures has been used to
41 finance natural flood management adjustments that
42 will benefit downstream communities, particularly to
43 flood prone properties in the town of Galashiels. This
44 has happened with the collaboration of Scottish
45 Borders Council, the developer (Scottish Power
46 Renewables), landowners, tenant farmers and Tweed
47 Forum.

48 In the UK, wind farm developers must seek consent
49 for works and have to fulfil conditions to gain plan-
50 ning permission. In this case, the developer was
51 obliged to either create suitable habitat to replace that
52 lost during development (dwarf-shrub heath), or to
53 pay a sum to the local council, who would arrange for
54 off-site mitigation.

55 The Dun Law Windfarm Extension Habitat Mitiga-
56 tion Project was organised, with Tweed Forum respon-
57 sible for a budget of £36 500 to create an agreed
58

59 amount of semi-natural habitat within an agreed area
60 and timescale. The preferred area was to be within the
61 'zone of visual influence' of the wind turbines, which
62 stand around 120 m to their tips, and to influence the
63 upper catchment of the Gala Water, the river which
64 runs through Galashiels and which has a history of
65 flooding commercial and domestic properties.

66 Tweed Forum approached landowners and farmers
67 to discuss the potential for installing natural flood
68 management measures along watercourses. The meas-
69 ures included planting native riparian woodlands,
70 hillslope woodlands, off-stream temporary flood
71 ponds and water margin protection. All these features
72 include multiple benefits for wildlife, landscape and
73 flood mitigation; if designed well, they can also
74 benefit the farmer.

75 Benefits to farmers include livestock safety (i.e. pre-
76 venting sheep and cattle from drowning in steep-sided
77 ditches), livestock health (i.e. keeping livestock apart
78 to prevent disease transfer), and easier livestock han-
79 dling using well sited fences. Crucially, it was possible
80 to draw upon other revenue streams. Having multiple
81 funding sources allowed the off-site mitigation funds
82 to be used to top-up multiple projects (which are not
83 100% funded) and to provide facilitation by way of
84 design, form filling, site management and advice. In
85 this way, external funds were levered into the project
86 and, by doing so, far greater semi-natural habitat and
87 flood mitigation measures were created.

88 Working with five farmers, the project has created
89 45.49 ha of new native riparian and hillslope wood-
90 land on the banks of the upper Gala Water; six off-
91 stream ponds; six floodplain scrapes/seasonal ponds;
92 1.2 km of fenced-off water margin; and identified and
93 protected 16.8 ha of species-rich grassland. Agri-
94 environment capital payments to farmers were
95 £148 000, with revenue payments of a further
96 £95 000. Thus, for every £1 received through off-site
97 mitigation, at least £6 was levered from additional
98 sources. The benefits of flood reduction, habitat crea-
99 tion, farm resilience and landscape improvement
100 represent a win-win from stakeholder, local and
101 organisational perspectives.

102 **Results: similar organisations, different contexts**

103 We have drawn together these organisations and
104 elicited case studies outlining successful problem
105 resolution with the aim of identifying the traits,
106 presumptions, knowledges and approaches that these
107 organisations associate with success, what has else-
108 where been described as a framing (Miller 2000).
109 More simply, we have asked what do similar organi-
110 sations, from similar contexts, dealing with nearly
111 identical challenges – albeit with contextual differ-
112 ences – have in common? We have identified patterns
113 amongst the organisations and across the cases, sug-
114 gesting to us the emergence of a distinct subclass of
115 NGO. Partly in response to discussions during the
116

1 knowledge exchanges in which participants expressed
2 frustration with the inconsistent and inexact 'NGO'
3 concept, but also recognising similarities in terms of
4 origin, mandate, approach, funding, relations with
5 government, and the challenges being addressed (see
6 Table 2), we describe the emergence of PCOs. We
7 argue that, in addition to responding to wider trends
8 within water resource management (Shrubsole 2007;
9 Johnson and Priest 2008; Fenemor *et al.* 2011b; Lane
10 *et al.* 2011b; Penning-Rowsell and Pardoe 2012), this
11 subdivision and definition confronts the tendency to
12 group and over-generalise NGOs. This responds to
13 what Eden *et al.* (2006) describe as the relative neglect
14 of NGOs within analyses of knowledge production in
15 the context of environmental challenges. The results
16 are summarised in Table 2, and we include a brief
17 outline of the PCO concept before turning to the three
18 shared principles in the ensuing discussion.

20 *The emergence of PCOs*

21 PCOs are more than catchment-bound NGOs. Rather,
22 they represent a subset of NGO with shared charac-
23 teristics and common framings, possibly as a result of
24 having evolved in the context of similar challenges.
25 Despite governmental, scale, political and economic
26 differences amongst the catchments and organisations
27 (Tables 1 and 2), the PCOs have surprisingly similar
28 histories. Each began in response to local problems
29 and their origins can be traced to dissatisfaction with
30 existing and often disconnected governance relative
31 to local priorities. For example, the Dee Partnership
32 began in response to water quality problems associ-
33 ated with diffuse pollution connected to poorly regu-
34 lated septic tanks; the FBC as a result of plummeting
35 numbers of Pacific Salmon (*Oncorhynchus tshawyts-
36 cha*) and poor water quality; the Motueka ICM group,
37 itself a hybrid organisation of activist-researchers, to a
38 host of issues, including river pollution associated
39 with faecal contamination from dairy production; and
40 the Tweed Forum to *ad hoc* river maintenance by
41 farmers removing gravel in response to flood risk. For
42 each organisation, existing governance failed, leading
43 to what can be understood as unsustainable practices
44 at the local scale due to an inability amongst govern-
45 ment to address the situation.

46 In response to local problems, each of the PCOs
47 developed mandates for intervention into land and
48 water management practices. For some, their aims
49 were made explicit through charters and clear objec-
50 tives, while others have remained less formal, choos-
51 ing to guide their actions in the context of 'problem
52 solving'. The organisations differ in their access to
53 funding, but despite these differences there is an
54 important common emphasis on entrepreneurial
55 efforts to locate funds from multiple sources, due in
56 part to a shared sense that funding has recently
57 become more scarce. For each organisation, their suc-
58 cesses have created a tension between assuming more

responsibility for wider catchment challenges against
securing the resources needed to operate. As part of
this issue, the already complicated relationship with
government has become more difficult. Governments
are at once: responsible for the poor management that
prompted creation of the PCOs, a partner seeking to
improve land-water management, and a source of
direct and indirect funding. This complicated relation-
ship with a key stakeholder is representative of the
challenges that occupy the PCOs (see Table 2),
leading to the identification of three shared principles,
which form the basis of our discussion.

72 **Discussion: the principles shaping PCO activities**

73 Returning to the growing academic discourse explor-
74 ing catchment management and alternative forms of
75 water governance, the case studies show that the
76 PCOs – both implicitly and explicitly – use as their
77 foundation three shared, entwined principles: to posi-
78 tion themselves between individuals (i.e. local scale)
79 and decisionmakers (i.e. regional and national scales)
80 while being trusted by both sets of actors; to enable
81 discussion amongst all parties in response to specific
82 challenges, as opposed to governmental divisions or
83 academic-based disciplines; and to ensure that,
84 whenever possible, the outcomes of collaborative
85 management of local problems result in 'win-wins'.
86 These principles are not unique to PCOs, but their
87 prevalence suggests a level of similarity that helps to
88 clarify the growing involvement of PCOs within devel-
89 oped world catchment management (Yearley 1996;
90 Eden *et al.* 2006; Marshall *et al.* 2010; Cook *et al.*
91 2012).

93 *Trust brokers (to overcome conflict and 94 disagreement)*

95 The case studies each describe a similar pattern: a
96 problem is identified, trust is earned, compromises are
97 mediated, and solutions are implemented. The key
98 difference between this process and 'normal' govern-
99 ance (Lane *et al.* 2011b) is that the PCOs each ensure
100 that, as a result of their activities, trust is the primary
101 outcome. For the PCOs, trust is the currency on which
102 further engagement with problems in the catchment
103 are based. Trust may well be the key determinant of
104 PCO success (Irwin 1995). For example, within the
105 Motueka catchment, declining water quality and
106 the inability for locals to swim in the rivers led to
107 the assemblage of interested and vested parties. With
108 a working relationship and trust established, that
109 group initiated an information gathering exercise that
110 allowed for a solution to be identified and imple-
111 mented. It was trust in this process (Irwin and Michael
112 2003; Fenemor *et al.* 2011b) that enabled success,
113 just as it was trust that allowed Tweed Forum to suc-
114 cessfully distribute wind farm levies or the FBC's
115 questioning of practices in the context of invasive

species. Similarly, in the Waimea River case study, accusations of improper use amongst farmers, foresters and urban users required a trusted party whose findings would not automatically be called into question. In each case study, it is trust in the knowledge and decisionmaking that is the primary outcome.

Trust also allows the PCOs to act as mediators amongst 'opposing' users, for example between Scottish Power Renewables and the Borderlands communities, or between the parties profiting from urban development and those who wish to improve water quality in the Dee catchment. The PCOs are shown to be dependent on their positions at the interface of local and regional/national scales. The PCOs are protective of their positions and view trust as the lifeblood of their operations. For example, the FBC's efforts to generate support for the poorly understood challenge of invasive species shows the need to build collaborative relations (next principle), but to accomplish this requires a trusted party able to ensure ethical mediation and assure stakeholders of a fair process in which their knowledges and interests will be seen as legitimate (Wynne 1996). Trust in the PCOs is also the basis for funding, leading to donors who are willing to pool their resources under transparent circumstances, assuming the ability to accomplish more collectively than individually. This concentration of funds is enabled by trust. Furthermore, their role as central mediators allows the PCOs to identify areas of common interest, which presumably reduces redundancy and frees funds for additional activities.

Collaborative decisionmaking (to deal with problems)

The PCOs that inform this discussion operate through collaborative decisionmaking based on horizontal power sharing, as opposed to hierarchical models common to governments. Underlying this approach, inseparable from the previously mentioned need for trust, is the aim of enabling compromise and building consensus amongst vested parties. A key aspect of these activities is the involvement of stakeholders with, as one respondent explained, some 'skin in the game'; in this way, the PCOs are able to negotiate solutions that ensure widespread acceptance. This approach lends support to a prevailing but poorly substantiated claim (du Toit and Pollard 2008; Reed 2008) that participatory solutions are more likely to last. As a result of this inclusiveness, stakeholder perceptions, anecdotes, values and experiential knowledge/expertise are incorporated into governance. These knowledges do not replace science, and science retains a prominent role within decisionmaking (Yearley 1993; Eden *et al.* 2006), but stakeholder views and opinions are not disregarded on the basis of being non-expert or unscientific.

The PCOs each connect a better understanding of socio-ecological challenges with the facilitation of

equitable compromises, but they rarely interpret the public as knowledge deficient or in need of education (Irwin 1995). PCOs regard public knowledge as crucial to decisionmaking and to their approaches. This leads to the identification of common ground, replacing uncertainty and conflict with a basis for compromise (Reed 2008; van Wyk *et al.* 2008; Fish 2011; Polasky *et al.* 2011). For example, Tweed Forum takes the perceptions of farmers as the starting point for efforts to limit diffuse pollution, recognising the farmers' interests (without judgement) rather than attempting to use punishments to demand conformity to policy. This approach is similar to the Sherry River case study, in which farmers knew that the collaborative solution, while costly, would pre-empt potentially more stringent measures by the state if the problem persisted. Overall, this approach results in organisations that have cultivated significant moral authority rooted in their promotion of participation for the public's benefit (Kesby 2007). For example, the FBC's inclusion of federal, provincial, local and First Nations governments on its board of governors, and in their assemblage of disparate groups to engage with the issue of invasive species, are representative examples of the complicated relations that the PCOs navigate in order to be successful. This need for multiple actors with a wide range of interests reflects the ubiquity of water-based problems, with the case studies showing the extent of connections across a hybrid land-water-social system.

Win-wins (lasting governance needs mutual benefit)

Trust runs throughout each of the case studies, most clearly in terms of the aim of facilitating 'win-wins'. As a result of trust, the PCOs show that they can draw diverse parties together to address a problem while delivering multiple benefits. In each of the case studies, the compromises show that most, and often all, of the stakeholders can amicably resolve problems if given the opportunity. The priority on win-wins solidifies the PCOs as trust brokers amongst actors with conflicting agendas (Fenemor *et al.* 2011b; Fish 2011). The centrality of 'win-wins' is a key trait of the PCOs and distinguishes their efforts from the assumption that management must (unfortunately) have losers (see Penning-Rowsell and Pardoe 2012).

In each case study, the PCOs challenge a zero-sum interpretation of environmental governance, placing a shared emphasis on hybrid (Whatmore 2002) environmental-social-economic problems. For example, the water allocation challenge mediated by the Waimea Water Augmentation Committee refuses to prioritise either the natural environment or the economic development that further abstraction could enable. Instead, abstraction is considered as part of the local economy, the natural environment and the social fabric of the area as part of wider analysis of the complicated relations between these

1 inseparable factors. For each of the PCOs, fisheries
2 also exemplify the inseparability of economic, envi-
3 ronmental and social factors. This is not to argue that
4 the 'three' factors always receive equal weighting.
5 Rather, the case studies show that solutions require
6 that decisionmakers take into account impacts
7 outside the immediate issue. The case studies
8 describe efforts to establish balanced trade-offs
9 between nature and society that will not impair the
10 ability of future generations to maintain or improve
11 their quality of life (Repetto 1986). In effect, this
12 approach is a 'win-win' across time, with many of
13 the PCOs working to revitalise and return damaged
14 socio-ecological systems to more sustainable levels.
15 The Dee Partnership's aim to make future urbanisa-
16 tion less detrimental, while helping to improve water
17 quality, is one such example. Overall, the PCOs are
18 shaped by recognition that long-term balance
19 requires that each party benefit from collaborative
20 efforts. The cases show how, through participatory
21 approaches founded on trust, complicated problems
22 can be resolved in ways that do not unduly punish
23 groups or individuals. Instead, participatory catch-
24 ment management is about informed and directed
25 development that recognises that long-term sustain-
26 ability is based on mutual benefit and inter-
27 dependence amongst interested parties.

28 Conclusion

29
30 The emergence of PCOs is part of wider changes to
31 catchment management in the developed world. A
32 host of processes and phenomena are pushing the
33 adoption of a decentralised and participatory form of
34 governance, following nearly a century of centralised,
35 expert-led and technically reliant approaches (Eden
36 *et al.* 2006; Blackstock and Richards 2007; Johnson
37 and Priest 2008; Cook *et al.* 2012). As a result, local
38 and collaborative decisionmaking is becoming more
39 widespread, reflecting consensus amongst those
40 responsible for addressing water-related problems in
41 developed world catchments. This trend suggests that
42 local decisionmaking will continue to proliferate, but
43 *how* it might be practiced remains less clear. To date,
44 examples of local collaborative decisionmaking are
45 said to be scarce, for example, Cook *et al.* (2012, 5)
46 declare 'truly effective local stakeholder engagement
47 is serendipitous, rather than facilitated'. The case
48 studies suggest otherwise. They show that a growing
49 number and variety of organisations are taking the
50 lead in catchment management, driving local agendas
51 through an inclusive approach founded on trust with
52 the aim of mutual gain. This argument, though, is
53 limited to the cases that we studied, which were
54 chosen because of their past successes. There is
55 reason to temper the findings as the representativeness
56 of these cases is unknown and likely unknowable
57 without longitudinal analysis. Alternately, what they
58 do is recognise an emergent trend within catchment

management and identify potential avenues for further
analysis and comparison (Yin 2003).

The emergence of PCOs is nascent and still evol-
ving, with numerous unanswered questions, four of
which we have chosen to highlight. The first involves
how governments will react to a redistribution of
power to local individuals and organisations? Gov-
ernments have historically maintained control of
catchment management through unequal power and
control of funding (Mustafa 2002; Penning-Rowell
and Pardoe 2012). If the ability to control catchment
management has been a reflection of economic
investment and regulatory authority, what are the
implications of the emergence of a local and partici-
patory model? Second, the cumulative impact of
local decisionmaking on national policy and interests
is an unknown and potentially unknowable factor.
National decisionmaking has its strengths. In particu-
lar, it is economical in that, once conceived, it can
form a relatively consistent, stable foundation. In
reviewing and contrasting the case studies, the eco-
nomic viability of these initiatives requires compari-
son with centralised, expert-led alternatives. Whether
these case studies are scalable remains unknown.
Third, the move to decentralise catchment manage-
ment and to devolve decisionmaking to local parties
remains a complicated objective. Does devolution
represent a new form of catchment management or a
new way to deliver existing catchment management?
The issue is whether central governments are willing
to share power with local stakeholders, and whether
this could lead to potential conflicts over, for
example, how disagreements between national and
local interests are resolved. This question is particu-
larly important in the context of controversial initia-
tives, such as the sacrifice of present gains for future
sustainability. This question is all the more important
during an economic downturn when communities,
regions and nations compete for investment and
development opportunities (Jackson *et al.* 2012).
Fourth, this analysis has indirectly contrasted compet-
ing forms of catchment management, one currently
dominant and rooted in democratic authority while
the other is emergent and rooted in participatory
authority. Lacking from the discourse is an apprecia-
tion for the entrenchment of ideas and practices.
Protocols, rules and history shape the context of
catchment management and, outside of resource
management, there are examples of dominant fram-
ings appropriating and pacifying emergent or critical
alternatives (Said 1978). Whether those empowered
by the present model will support, approve and
implement the solutions proposed by PCOs remains
an unknown but important aspect of catchment man-
agement in Canada, New Zealand, Scotland and the
Scottish-English Borderlands.

PCOs are growing in number and influence in the
developed world. Amongst the amorphous group
labelled NGO, this subgroup is distinctive due to its

shared origins, objectives, approaches and challenges faced. Specifically, their aim of socio-economic-environmental sustainability; their position as trusted, central figures who mediate and reconcile competing interests and scales; their inclusiveness toward stakeholders; their approaches to funding and to multiplying investments from diverse sources; and their presumption that win-win scenarios are a prerequisite all help to explain their growing influence over catchment management. This in-depth engagement has allowed us to identify principles for other organisations interested in this ongoing reconceptualisation and reorganisation of developed world catchment management.

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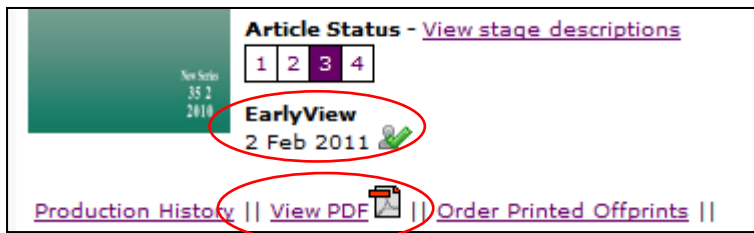
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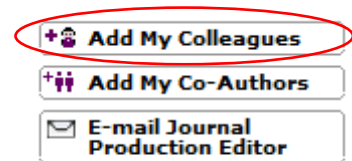
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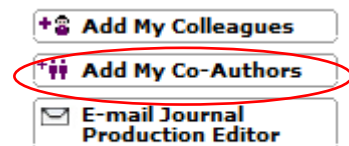
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