Short term projects versus adaptive governance: conflicting demands in the management of ecological restoration

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Abstract

Managers of ecological restoration initiatives face contradictory demands. On the one hand they have to raise funds from a variety of sources through competitive procedures for individual projects. These projects require the specification of deliverable outputs within a relatively short project period. On the other hand, ecologists argue that the complexity of ecosystem processes means that it is not possible to know how to deliver predetermined outcomes and that governance should be adaptive, long term and implemented through networks of stakeholders. This debate parallels a debate in public administration between New Public Management and more recent proposals for a new approach, sometimes termed Public Value Management. Both of these approaches have strengths. Projectification provides control and accountability to funders. Adaptive governance recognises complexity and provides for long term learning, building networks and adaptive responses. We suggest an institutional architecture that aims to capture the major benefits of each approach based on public support dedicated to ecological restoration and long term funding programmes.

" ... the gradual development towards increasingly non-permanent and informal structures is, in fact, one of the most important – although still very much neglected – administrative changes of the past decades."
[1] (p.165)

1. Introduction

Active intervention into ecosystems for conservation purposes requires the investment of resources that have opportunity costs. Sponsors demand that funds are used efficiently and increasingly funds for conservation are allocated and managed through the mechanism of specified and relatively short term projects [1][2]. A project may be defined simply as "a single intervention characterized by a fixed time schedule and dedicated budget" [1](p.166). This implies control over the allocation and expenditure of funds by the organisation that controls the budgets. The literature suggests project share a number of characteristics [3] (p.174-5):

- a unique, once-in-a-lifetime task;
- a predetermined time frame;
- subject to one or several performance goals (such as resource usage and quality); and
- a number of complex and/or interdependent activities.

In the UK, a series of large-scale conservation initiatives are being developed by a range of organisations in response to growing concern for landscape-scale ecological patterns and processes and interest in ecological restoration as a conservation strategy [4] [5] . Ecological restoration requires long-term control of land management to allow time for ecological processes and associated habitats to become established [6]. Larger-scale restoration may demand the coordination of management beyond the borders of existing areas managed for conservation, involving a range of landowning partners, including state and non-state actors (such as private landowners and managers and non-governmental conservation organisations and trusts, [5]). Fragmentation and institutional inefficiency constrain landscape-scale ecological management and restoration [7].

A survey of managers of large-scale conservation initiatives in the UK [8] [9] analysed the ways in which such initiatives are being planned and managed. It identified a series of challenges in responding to the short-term imperatives of the funding regimes while at the same time seeking to maintain consistent long-term adaptive approaches to land management. We draw on this work to illustrate the perspectives of the restoration managers towards the issues raised here. This paper reviews the contradictory demands on ecosystem restoration projects in the light of the literature on New Public Management and projectification. After considering the implications of the project based funding that often supports ecological restoration, the paper examines the arguments for adaptive governance. The critique of projectification here reflects similar critiques of New Public Management and the paper considers the relevance of moves towards Public Value Management in public administration for conservation planning. Both approaches have aspects that have the potential to make a positive contribution to the effective implementation of ecological restoration initiatives. The paper seeks to integrate the best

elements in proposing a new architecture for the implementation of ecological restoration, combining the opportunity for adaptive governance with the incentives and accountability provided through a project-based approach.

2. Projectification in ecological restoration

Large scale ecological restoration in the UK is typically implemented by independent conservation organisations or consortia of organisations (often led by non-governmental conservation trusts), supported by one or more funders, which may be a charitable fund, a private firm or a government agency [5]. Restoration costs are covered through public funding provided in the UK, from other government departments, or from charities or lottery funds.

The shift towards large scale conservation initiatives [5] [9] means that conservation actions are increasingly undertaken beyond protected areas in the wider countryside, which in the UK and other European countries are usually held in private ownership [10] . Groups of landowners and occupiers are incentivised to co-ordinate their actions and to alter land uses, generally away from those uses that would maximise profit for the landholder. Such coordination is not straightforward: neither conservation project managers nor landholders (even if the same) can force cooperation from neighbours [7]. Funds are thus generally required to cover both the direct and opportunity costs of changes in land use and the transactions costs of organising and administering conservation activities. These costs are primarily covered either by government, such as under agri-environment schemes (until BREXIT predominantly through Pillar 2 of the Common Agricultural Policy), or by funds secured through lotteries, charitable foundations or from private businesses, such as through corporate social responsibility. Conservation organisations also raise funds through membership payments and donations.

The various categories of agent involved in funding ecological restoration are illustrated in Figure 1. The driving force for restoration may rest with the funder (e.g. a private company restoring a mineral extraction site as a requirement of planning), or the implementing organisation (e.g. a conservation NGO such as the Wildlife Trusts or RSPB). But in either case, the funder of such work has a powerful role in shaping the scope and timing of the project. The funder can be thought of as outsourcing specific components of their own programme of activity to external organisations, whether that involves a desire to fund conservation or restoration project, a direct but more general concern to encourage restoration, or the ability of a restoration project to deliver other aims of the funder (e.g. a restoration project that is funded primarily to provide public access or environmental education on a restoration site).
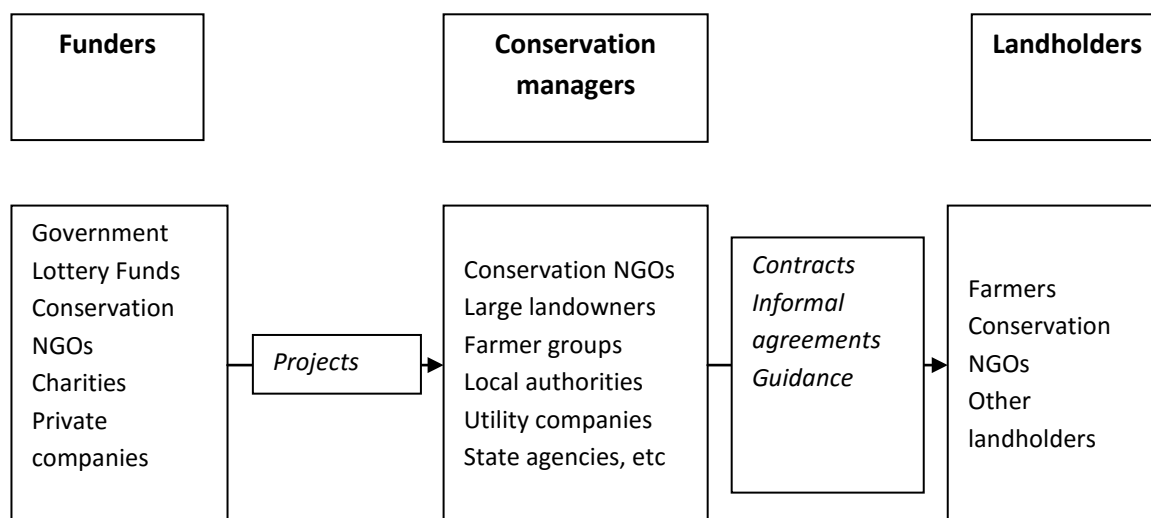
Funders	Conservation managers	Landholders
Government Lottery Funds Conservation NGOs Charities Private companies	Conservation NGOs Large landowners Farmer groups Local authorities Utility companies State agencies, etc	Farmers Conservation NGOs Other landholders

Projects → | *Contracts Informal agreements Guidance* →

Figure 1. Funding processes for ecological restoration

Whatever the direction of intent, the engagement between the programme of the funder and that of the conservation manager leading the project involves bundling restoration activities into separate work packages, and an element of competitive tendering for the work to be undertaken (in that conservation organisations seeking funding from charities do so competitively, even if they compete with projects that do not have a restoration component). The funder will require a specific output to be delivered and the project proposal and related contracts will specify the way in which the work will be undertaken, setting out milestones to be achieved to monitor the progress being made towards successful completion. Projects are typically funded for a fixed and often relatively short period of time within which the outputs have to be delivered. There will be clauses in the contract specifying actions that will be taken under a range of possible circumstances and these may be invoked if progress fails to match the plan set out in the accepted project proposal. At the end of the agreed contract, if the work is to be continued, a new project may be proposed and a new contract issued, initiating a new project cycle. This process has been termed as 'projectification' [11].

Funds are thus allocated, often on a competitive basis, to projects that can persuade funders that they will deliver the agreed outputs. Calls for applications for funds draw out ideas and proposals for ways in which the funds may be applied in pursuit of the funder's objectives. The process of preparing bids promotes horizontal partnerships amongst stakeholders who can bring different types of resources to address the project objectives. Wolf [12] (p186) characterises projects as "temporary platforms for emergent constellations of actors to interact and learn". Funders require assurance that projects can deliver the planned outputs with a high degree of financial control. This assurance is provided through applications that set out in detail how the outputs are to be generated within the relatively short defined time period. Milestones are erected to facilitate control over the progress of the project and to enable the funder to see whether or not progress is on track to deliver the planned outputs. Funders will

evaluate proposals ex ante and rank them, perhaps implicitly, in terms of the ratio of benefits promised over funds sought. Competition amongst applicants will oblige them to reveal their capabilities and costs and allow the funder to select the most promising options [13]. The need to reassure funders creates an incentive for applicants to be relatively unambitious and offer outputs that can be guaranteed. Projects are time-limited so that control over funding can be maintained over time through a series of project cycles: successful projects may be renewed and unsuccessful ones terminated. This also offers the funder a chance to redistribute funds towards novel outputs or to stakeholders who may be seen to have been underprovided for in previous project cycles, perhaps to enhance perceived spatial or sectoral fairness in fund allocation.

Similar approaches have been adopted in other countries. Borgström et al. [14] have developed a database of all government funding for ecological restoration in Sweden between 1995 and 2011. They show that funding was predominantly small scale and short term, reflecting the wider movement towards 'project proliferation'.

New Public Management and Restoration Projects

The shift towards undertaking activities for public benefit through discrete projects may be seen as emerging from neoliberal initiatives to roll back the state such as in the 'New Public Management' (NPM) [15] [16]. NPM covers a variety of approaches adopted across different countries at different times primarily associated with the rationalistic search for efficiency in public management. Hood [17] suggests seven dimensions that have generally been associated with NPM:
1. A disaggregation of public organizations into separately managed 'corporatized' units for each public sector 'output'.
2. A shift towards greater competition.
3. A move towards management practices used in the private sector.
4. A move towards greater stress on discipline and parsimony in resource use and a search for less costly ways of delivering public services.
5. A move towards 'hands-on management' of public organizations.
6. A move towards more explicit and measurable standards of performance.
7. Attempts to control based on output measures.

A survey of managers of large-scale conservation initiatives in the UK revealed evidence of the influence of the 'New Public Management' on project funding and development [8] [9]. Interviews were undertaken with managers of 27 large-scale conservation areas in the UK between January and September 2012. Initiatives were selected from a database of 800 separate large-scale conservation initiatives compiled by Southampton University [8] [9]. Initiatives were selected purposively, taking into account size, number of landholders, the range of environments across the UK and the nature of the lead organisation. In-depth interviews using a common schedule of questions were conducted face-to-face (n=23), the rest by phone or *Skype* (n=4). Questions were open-ended and shared with interviewees before the interview. By agreement, all interviews were recorded, transcribed verbatim and coded to identify and group passages on common themes that could be linked across interviews. All quotes in this paper are anonymous, identified by a unique code number.

The pressure for projectification was strong:

> *A lot of other projects, at least the other projects that I'm involved with… tend to literally be 'projects' – they are clearly defined, they've got a short period, maybe 3-4 years of funding, and it's the funding that leaves them… Everything comes together around a funding bid. But if we're talking about large landscape-scale management, the ecosystems, then that's actually not helpful. (Interview 9)*

Funding is drawn from multiple sources, and not always focused on the delivery of the primary goal of ecological restoration:

> *We set ourselves, to our funders, we set some targets about how much habitat that was going to be or how much we could change. Now we worked on all sorts of habitat, including grassland and other things, but we were only really reporting on the woodland because that's what the funders paid for. (Interview 2)*

Restoration managers may need to cast around for projects that will be attractive to potential funders.

> *Sometimes we've got a little bit of money through the National Park, sometimes we've got money through SRDP, we're looking at getting money now through landfill to try to develop a project which will help manage the sites and create new habitat, so it really is, you know, . . . (Interview 26).*

> *We've got to work out a system that will… bring in different [funding] streams and maybe that's looking at… carbon credits or ecosystems services in some way providing something that someone wants to buy into. (Interview 10)*

But this still operates on a project-basis.

> *We are being encouraged to engage with people who are managing our sites to manage them for biodiversity, for carbon, for water, but still within a fairly, not 'ad hoc', but disjointed funding framework which only looks at short-term funding. ([Interview 1)*

And there may not be a close match between what funders will support and the aims of the restoration managers

> *But there are disadvantages to . . . grant aid, in that you. . . the grant giving bodies each have their own . . . Obsession or expectations or conditions. (Interview S3)*

Once projects are completed, then there may be a need to find new and different objectives in order to attract further project funding. One respondent commented:

> *With [landscape scale projects], people fund them, and then they say, 'fantastic, it's a great success – we can never fund it again. You've shown what works, now we can't pay for that, you have to do something different (Interview 2).*

This complexity raises the transactions costs of ecological restoration. Many initiatives experience, "*very complex financial administration*" (Interview 8) and organizations often employ a Grants Officers, or an entire team of people to work on grant applications, especially if the organisation runs a large scale conservation programme or numerous large scale conservation areas.

And of course a failure to secure funds can bring the whole restoration endeavour to an end. One respondent commented '*I mean, if we get this Heritage Lottery Fund my post continues for a period of time as well, but if it doesn't ....' (Interview 25).*

3. The rationale for adaptive governance

Projectification involves ceding a degree of control over restoration activities to funders, through agreed funding and outputs. The need to set out intended outcomes to be delivered within a defined period of time encourages an approach that underplays the inherent scientific uncertainty in restoration ecology and practice. Hilderbrand, et al. [18] describe five 'myths' of restoration ecology: (1) that we can restore or create an ecosystem that is a carbon copy of a previous or ideal state, (2) that the community and ecosystem assembly process follow a repeatable trajectory, implicitly ignoring uncertainty, (3) that it is possible to accelerate ecosystem development by controlling pathways, such as dispersal, colonization, and community assembly to reduce the time taken to create a functional or desired ecosystem, (4) that we can apply the same restoration techniques in a range of different restoration efforts, and (5) that goals can be achieved by active intervention and unending control or manipulation of physical or biological components of the ecosystem. Morsing et al. [19] examined evidence of the acceptance of these myths in 13 Danish LIFE projects. They found that two assumptions, of a predictable single endpoint and that nature is controllable were notably frequent in the projects. Schultz et al. [20] are critical of the European Natura 2000 process for its top down nature and lack of adaptability. "What made sense at the European level and from a biodiversity conservation point-of-view was met by resistance at the local level and by other sectors of society, and there was limited capacity to adapt the process to accommodate their perspectives and solve the conflicts" (p. 7372).

In response to these uncertainties, ecologists are increasingly advocating adaptive governance (AG), or adaptive co-management, in the restoration of ecosystems following an ecosystem approach. The two terms are often used synonymously [21] and we adopt the former here. Ludwig [22] asserts that "the era of management is over", that the management paradigm fails when confronted with complex problems. Chaffin et al. [21] argue that "there is a need, therefore, to champion new approaches to environmental governance capable of confronting landscape-scale problems in a manner both flexible enough to address highly contextualised SESs [social-ecological systems] and dynamic and responsive to adjust to unpredictable feedbacks between social and ecological system components". Schultz et al. [20] (p.7372) make the same argument.

The restoration managers in our survey recognised this approach in their restoration practices:
> *The way we work together sort of reflects the philosophy of working with natural processes. Natural processes are opportunistic, they aren't always defined, they aren't always very clear... To a degree we are a bit like that, we sort of react to demands and look at who's got the skills and abilities and time to do it. (Interview 9)*

Attempts to restore ecosystems face high levels of uncertainty. The interrelationships and feedbacks amongst ecosystem functions are imperfectly understood and so the consequences of ecosystem interventions cannot be predicted with certainty. And outcomes are also vulnerable

to unpredictable changes in external factors. The consequences of alternative management arrangements thus cannot be predicted with certainty. In some circumstances, it is appropriate to follow 'open-ended' approaches to restoration that recognise the long-term ecosystem behaviour involves continual change [23]. Ecosystems can be subject to unpredictable state changes and the risk of this happening is exacerbated by a loss of resilience. It is thus argued that sustainable management should focus on building the resilience of the system [24]. Adaptive management [25] recognises this context and argues that management cannot set clear objectives but rather operates on an iterative basis, seeing interventions more as experiments to generate information to feed back into future decisions. Ecological restoration involves trade-offs with different actions benefiting different taxa and ecosystem functions, and actions can take decades to become effective [26]. The aim of restoration will often be to build the resilience of the system against unknown future shocks, such as through the maintenance of functional redundancy to underpin service provision, rather than to seek to achieve a predetermined output.

The restoration of ecosystems demands inputs from a broad range of different types of stakeholder. Some will provide land, others will provide entrepreneurship, agricultural management, administrative capacity, funding, voluntary labour, or monitoring and research expertise. These capabilities and resources need to be harnessed and co-ordinated, often relying on high degrees of mutual trust and commitment. This will usually involve a mix of private and state organisations in some form of co-management [27] [28]. The management of restoration requires the management of both ecological and social systems in an integrated way. In parallel with the approach to the ecosystem, institutional arrangements also need to be flexible and to adapt and change as experience develops over time. Taken together this indicates a role for the adaptive governance of social-ecological complexity [29] [30]. This is often defined as "a process by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, ongoing, self-organized process of learning-by-doing" [31] (p.75).

The mix of stakeholder roles was a consistent feature of large scale conservation initiatives:
> *Each partner is not only able to contribute different skills but also gain something from it… the project partners… all have their own strategic plans and their own targets and goals they have to deliver against, and so they hope [the initiative] can help them deliver… It's a sort of happy symbiotic relationship. (Interview 8)*

Interviewees expressed their belief that community engagement was needed to, "*achieve sustainable land use change*" (Interview 7), and that it was, "*important to keep the focus on maintaining the relationship with local people.*" (Interview 1).
And these processes take time to develop:
> *You can't build a relationship with people and with a landscape over a year or two years. It takes years of doing that and responding to change as that happens. (Interview 9)*

Plummer et al. [32] have undertaken a systematic review of the literature linking adaptive co-management with environmental governance. Olsson et al. [31] identify seven features that support the emergence of adaptive co-management of social-ecological systems:
- Enabling legislation that creates social space for ecosystem management
- Funds for responding to environmental change and for remedial action
- Ability for monitoring and responding to environmental feedbacks

- Information flow and social networks for ecosystem management
- Combining various sources of information for ecosystem management
- Sense-making for ecosystem management
- Arenas of collaborative learning for ecosystem management

They (p.87) conclude "The shared vision of the actors and the self- organizing process, supported and framed by enabling legislation and governmental institutions, have the potential to expand desirable stability domains of a region. It creates an 'adaptive dance' between resilience and change with the potential to sustain complex social–ecological systems."

4. Contrasting the approaches

Both approaches, projectification and adaptive governance, have to deal with issues of complexity, multiple stakeholders, the need for leadership, the need for formal commitment and clarity in dealing with conflict resolution. However, the two approaches adopt very different positions as illustrated in Table 1. It may generally be suggested that ecologists would favour adaptive governance while administrators (and arguably politicians) favour projectification.

Table 1. Comparison of short term projects and adaptive governance approaches.

	Short term projects	Adaptive governance
General goal	Efficiency	Resilience
Outputs	Delivery of planned output	Outputs evolve; enhanced knowledge for future management
Monitoring	To check implementation of plan	To better understand system and guide future decisions
Accountability/ Power	Control by funder via plan implementation	Shared ownership amongst local community and other stakeholders
Actors	Those bringing planned resources	Those with interests
Knowledge	Implementing contract	Collaborative learning
Management	Minimise deviation from plan	Adaptive approach to new information
Uncertainty	Design plan to minimise impact of uncertainty	Expect and learn from uncertainty
Institutional arrangements	Fixed over project period	Continuous change
Time horizon	Focus on delivery by milestones and projects	Continuity of management and institutional memory over long term

5. Alternative governance models

The strength of projectification in conservation and restoration reflect the influence of a New Public Management (NPM). This has come under increasing criticism in public administration more broadly. Hood and Dixon [33] for instance have cast doubt on the success of NPM in terms of its capacity to cut costs of government. Bryson, Crosby and Bloomberg [34] argue that a new movement is emerging to replace NPM that pursues values beyond efficiency and effectiveness. This is variously termed 'public value governance', 'new public governance', or, by Stoker [35], Public Value Management (PVM). Rhodes [36] suggests there may be a return to the 'craft' of public administration. He characterises the new approach as a representing a shift from hands-on to hands-off steering by the state, working with and through networks or webs of organisations to achieve shared policy objectives. The newer approaches reflect clear parallels with the concerns raised by projectification and the approaches indicated by adaptive governance. What is the potential of PVM in restoration management?

Stoker [35]sees PVM as a new paradigm for public administration. In contrast to the narrower utilitarian character of NPM, PVM adopts a broader approach to public value which is collectively built through deliberation amongst elected and appointed government officials and key stakeholders (p.42). Governance operates through networks of deliberation and delivery in pursuit of public value. This is fleshed out by four propositions:
- Public interventions are defined by the search for public value.
- There is a need to give more recognition to the legitimacy of a wide range of stakeholders.

- An open-minded, relationship approach to the procurement of services is framed by a commitment to a public service ethos.
- An adaptable and learning-based approach to the challenge of public service delivery is required.

PVM is based on a relational approach to service procurement where client and contractor see each other as partners, looking to sustain a relationship over the long run and not narrowly focussed on any individual contract. PVM emphasises the role of reflection, lesson drawing and continuous adaption. Managers are expected to clarify and express the needs of clients and then tasked with designing and implementing programmes in order to meet them through partnerships. They are tasked with steering networks of deliberation and delivery and with maintaining the overall health of the system. They need to engage in a dialogue in a way that allows for deliberation about choices and alternatives. As contexts and preferences change, this implies a process of continuous evaluation and learning.

This presents significant challenges for efficiency, accountability and equity. The challenge to accountability in particular has been recognised in the context governance networks [37] and of ecological management. Hahn [38] observes that "Governing and ensuring accountability of governance networks, without hampering their flexibility, adaptability, and innovativeness, represents a new challenge for the modern state".

Stoker [35] argues that PVM adopts a different worldview from that of NPM, based on a cooperative perspective: "people need to share and come to endorse each others' viewpoints. The bonds of partnership enable things to get done that no amount of rule setting or incentive providing can deliver." (p.51). Accountability is achieved by negotiated goal setting and oversight based on complex and continuous exchange among leadership and checks and balances to that leadership to ensure that leadership is facilitative. Accountability then arises from more extended citizen involvement. It thus tends to be informal rather than formal. Romzek and LeRoux [39] and Romzek et al. [40] have studied informal accountability amongst social service networks in the United States. They identify social norms and facilitative behaviour developing in order to maintain order and accountability amongst collaborating agencies and sub-contractors with complementary but different missions, agendas and protocols. These are supported by an informal system of rewards and sanctions and relationship building, but threatened by organisational obstacles. Informal accountability "emerges from the unofficial expectations and discretionary behaviours that take shape through repeated interactions among network members cognizant of their interdependence in pursuit of their shared goal(s)" [40](p.816). It can be challenged by financial pressures that undercut collaborative activities such as relationship building.

Butler et al. [41] have made a similar observation in the context of collaborative implementation of ecological restoration on US forest land. They comment (p. 573) that the process "appears to strengthen USFS [United States Forest Service] accountability to collaborators through such informal and relational mechanisms where understandings and concerns emerge through collaborative interaction" and that "Multiparty monitoring, … provides a direct set of mechanisms for strengthening accountability as stakeholder values and perspectives are integrated into implementation processes through participation and dialogue". Hahn [38], in an

analysis of the multilevel governance network of Kristianstads Vattenrike Biosphere Reserve in Southern Sweden, refers to shared accountability in this type of context.

It is accepted that ensuring accountability is not straightforward in that it requires high levels of trust and active citizen engagement, raising fundamental questions about the nature of democracy. There is an inherent tension between management and democracy. "Vigilance and regular critical review by all the partners in the system is central to ensuring that the promise of both stakeholder democracy and management is delivered" [36] (p. 56). Rhodes suggests that, put simply, "management and markets are the priority for NPM while delivering services to citizens is the priority for New Public Governance" or PVM. To extend this simplification, we might suggest that ecological restoration is being managed on the basis of the former while in many ways better fitting into the latter. But as he further emphasises, what is important is to identify what works and what skills are required in a particular context [36](p.7).

6. Towards an architecture of funding for ecological restoration

Notwithstanding the criticisms, projectification has addressed a variety of the challenges faced by government and other funders in providing support for ecological restoration in the UK. It stimulates ideas and proposals for restoration from a range of stakeholders, it promotes collaboration amongst stakeholders who can bring different resources and capabilities to the project (at least in the short term), competitive bidding creates incentives for organisations to leverage matched funding and other resources and promotes cost-effectiveness, it provides for financial control and accountability as well as control over the management of ecosystem interventions. It ensures regular opportunities to review objectives, check on progress and reallocate resources to other, potentially more effective groups and projects over time. But there are significant limitations too. Projectification encourages, and in some instances requires conservationists to select less relevant, unambitious and potentially counterproductive objectives for their activities. It sets short time horizons over which projects need to be able to show demonstrable outputs, it interrupts longer term efforts to build relationships and trust amongst stakeholders, it raises transactions costs in terms of the resources required to prepare proposals and bid, often unsuccessfully, for funds and report on completed projects, it fails to ensure continuity of employment for those engaged in conservation activities.

Adaptive governance potentially offers solutions to many of these limitations, but at the risk of undermining the benefits. And the adoption of adaptive approaches is not straightforward. Westgate et al. [25] comment that adaptive management has rarely been achieved in practice. It is often seen as too open ended for rigorous financial control and too indeterminate in terms of guaranteed outputs. The question is whether there is some alternative approach that can capture the advantages of both approaches, drawing on the emerging shift towards PVM in public administration.

Any system to promote ecosystem restoration needs to promote entrepreneurial activity, to enable administration and facilitation, and to provide funding to cover these functions and to cover the direct and opportunity costs of changes in land management. It may well be that in some circumstances the restoration of ecosystems can be supported by a new funding stream through a Payment for Ecosystem Services (PES) scheme [42] [43]. This option needs to be

explored, subject to the primary restoration mission. The goals should not be conceived narrowly in terms of biodiversity conservation.

By definition, ecological restoration demands a long term commitment to consistent land management, and so long term funding must be potentially available. There needs to be an assured fund dedicated to support restoration activities in the long term. But funding for individual restoration initiatives or for specific partnerships cannot be unconditional. The funder needs assurance that the approach is in some sense 'on track' and that the management is cost-effective. However, it may not be possible to identify in advance discrete milestones and specific long term outcomes to be achieved. In place of this, there needs to be periodic transparent ex post deliberation as to the quality and direction of management. This allows greater discretion to the use of funds in ecosystem restoration subject to its subsequent justification. There is a parallel here with the governance of charities more generally but in addition it will require assessment by experienced individuals who can review the quality of ecosystem management and effectiveness of the expenditure committed in the previous period.

Rather than focussing on individual projects, one at a time, funding for ecological restoration might be thought of as developing funding programmes, setting a series of short-term projects within the context of a longer term programmatic framework. This funding process might itself adopt an adaptive approach where individual projects are seen as experiments within the context ecological restoration funding.

This suggests the need for a core public funding source that is dedicated to the purpose of ecological restoration. This might be regionally based and should have the
- capability to assess restoration priorities within its locality of responsibility but across different ecosystem services,
- ability to fund direct, opportunity and transactions costs incurred in undertaking restoration work,
- potential to deliver long-term continuous funding in where justified, and
- capability to assess progress in adaptive governance.

The core funder would invite potential restoration managers to tender for ecological restoration projects. Successful projects would be funded for a fixed period of time in order to initiate restoration activities, covering the costs of the identification of ecological priorities and planned ecological interventions, liaison and building relationships with relevant stakeholders, and identification of alternative potential funding sources that would be consistent with and complement the ecological priorities. Agri-environment schemes represent a major potential funding source to support land managers. There would also be potential for the development of Payment for Ecosystem Service schemes, commercial activities and sponsorship from other public or private sources. This could lead to plans for ecological restoration on a longer term programme, recognising potential complementarities in the delivery of different ecosystem services to different groups of beneficiaries.

If successful, this would allow funding to be offered for a programme (national or regional) of sequential, time-limited projects to implement an adaptive approach to ecological restoration. It is to be expected that the core funding provided by the core funder would enable the restoration manager to leverage additional funding streams, for activities, potentially

implemented by other agents but complementing the aims of the ecological restoration programme. The activities in the primary ecological restoration and in the wider programme of ecosystem service delivery would be assessed periodically by the core funder and funding would be continued where progress was judged to be satisfactory. Adaptive governance raises challenges for conventional approaches to evaluation, requiring analysis that goes beyond the physical impact on the ecosystem [44] to give attention to the ecological and economic components as well as the process component that looks at the role of institutions and power [32]. Restoration should be viewed in its social and political context [45]. The assessment would consider progress in ecological land management, the development in the delivery of ecosystem services, the changes in the assessed resilience of the ecosystem, and the development and quality of networks amongst stakeholders engaged in the various aspects in support of ecological restoration.

Under this approach, accountability could be attained in various ways. There would be a direct vertical accountability from the core public sector funder, itself under democratic control, to maintain oversight over the activities of the ecological restoration manager. Failure to meet the required standards could lead to the termination of the programme. Projects funded by other funders would be subject to scrutiny by their funders and the delivery of PES schemes would be subject to scrutiny by the beneficiaries of the ecosystem services themselves. Over time, as a network of stakeholders develops and interactions amongst stakeholders become more complex, then informal accountability will become more important. The partners in restoration activities will look to each other for transparency and cost effectiveness in expenditure, potentially supporting this through informal sanctions. Failure of one partner potentially undermines the opportunities of the others and so they have an incentive to monitor each other. There are parallels here with analysis of self enforcement in collective action (c.f. Ostrom [46]).

The funding programme could be judged to be concluded when the governance of the ecosystem becomes self supporting through internal decision-making processes, informal and internal accountability and external sources of funding in payment for benefits provided to external stakeholders. This is not to suggest that the problem is 'solved' but rather that the institutions to manage the system have developed sufficiently to become self-sustaining. However, this may potentially never be achieved while the ecosystem is delivering public goods to beneficiaries outside of the local area under ecological management. In this context, public funding would continue to the extent that the ecosystem management is delivering public good benefits for which beneficiaries are not making a direct contribution.

7. Conclusions

Conservation is increasingly being directed towards the management and restoration of larger areas [4] . Managers of ecological restoration initiatives are under competing pressures. Funding sources demand short-term projects to be won competitively with discrete and well-defined outputs. But at the same time, ecologists are questioning this approach, arguing that restoration should adopt adaptive governance that brings together groups of stakeholders undertaking ecological interventions on an experimental basis and accumulating information towards enhanced ecosystem resilience. There are parallel developments in thinking between ecology and public administration where the neoliberal approach embodied in NPM is being

challenged by a broader conception of value, working though networks of partners, such as represented by PVM.

Both approaches offer particular advantages, suggesting that the issue is not one of simply selecting one or other approach. A key issue concerns accountability. Adaptive governance advocates a long term perspective and accepts uncertain outcomes. But in this context, how can funders be assured that funds will be accounted for and 'well' spent? In this context, we have sought to sketch an institutional architecture that draws the two approaches together. This centres around a core public fund that is dedicated to ecological restoration administered by or on behalf of government. It supports programmes of long term funding for ecological restoration, subject to evidence that the activities and progress meet certain standards. These standards relate to institutional development, network creation, building trust and ecological understanding, and levering additional funding, as much as they do to the achievement of predetermined environmental outcomes.

We argue that this approach has the potential to offer greater continuity for ecological management, with a clearer focus on ecosystem management and lower levels of transaction costs. But at the same time it creates an incentive for restoration managers to seek and build partnership arrangements and to identify the beneficiaries of ecosystem services who may be expected to pay for the delivery of a service. It will take time to develop trust amongst potential partners and to identify and introduce institutional arrangements under which payment from beneficiaries will be forthcoming. There is thus an argument for public funding in the short term while new institutions are developed and implemented. At the same time, ecological restoration can also generate public goods that, given the level of transactions costs, will never be supported through market processes. Longer term public funding is legitimated by these missing markets.

There are thus various possible sources of funding beyond direct subventions from taxpayers. We argue that ecological restoration should be seen in a broader context of ecosystem governance [47], alongside management of land and water [48]. It should also be viewed in the context of agricultural policy where agri-environment payments [49] as well as direct payments made under Pillar 1 of the Common Agricultural Policy, or a subsequent policy, can be directed towards forms of land use and land management that make a positive contribution towards the delivery and maintenance of ecosystem services. BREXIT offers an opportunity in the UK to explore a wider range of policy approaches.

More research is needed in order to explore the conceptual frameworks and the practicalities of alternative forms of ecosystem governance. Such examples exist and more needs to be done to synthesise experience and mainstream successful models. However, given the spatial heterogeneity in the physical and social environments there will be no universal solution. Institutional models will need to be tailored to individual local contexts.

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