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Improving environmental decisions: A transaction-costs story

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ABSTRACT

A multidisciplinary team of researchers made efforts to influence the design and implementation of environmental policy in Australia. A focus of these efforts was the development of the Investment Framework for Environmental Resources (INFFER). In addition, the team undertook a range of communication activities, training, user support, and participation in committees and enquiries. Transaction costs were relevant to these efforts in a variety of ways. Environmental managers perceived INFFER to involve relatively high transaction costs. A balance was struck between the system having simplicity (and low transaction costs) and delivering environmental benefits. Transaction costs were factored into the planning and prioritisation processes developed. For example, public and private transaction costs are accounted for in the calculation of benefit:cost ratios and in the choice of policy mechanisms. There are diverse roles that transaction costs play in the processes of developing, implementing and influencing environmental policy programmes. A key observation is that appropriate strategic investment in transaction costs can improve decisions and increase net benefits from an environmental programme. A well-designed decision process can involve incurring transaction costs at one stage in order to save transaction costs at a later stage.

1. Introduction

In 2000, the Australian government announced a new environmental programme, the National Action Plan for Salinity and Water Quality (Anonymous, 2000). The stated goal of the programme was "to motivate and enable regional communities to use coordinated and targeted action to: prevent, stabilise and reverse trends in dryland salinity affecting the sustainability of production, the conservation of biological diversity and the viability of our infrastructure; improve water quality and secure reliable allocations for human uses, industry and the environment" (Anonymous, 2000, p. 5). The programme provided A$1.4 billion for expenditure largely on extension services to farmers and financial support for salinity management by farmers, various organisations and government departments (Pannell and Roberts, 2010). Soil salinisation, especially of non-irrigated land, was recognised as a serious and costly problem affecting millions of hectares of agricultural land, native vegetation, physical infrastructure (especially roads) and water quality in important catchments (George et al., 1997; Ghassemi et al., 1995; Pannell, 2001a). These impacts, and predictions that they would increase dramatically in coming decades (e.g. Murray Darling Basin Ministerial Council, 1999; National Land and Water Resources Audit, 2001), were the subject of intense media coverage and debate at the time (e.g. Beresford et al., 2001), providing the impetus for the establishment of the National Action Plan. [1]

At the time, the lead author was involved in a range of salinity-related research projects, including research on: the farm-level economics of salinity management strategies (Bathgate and Pannell, 2002); the externalities that arise from salinity (Pannell et al., 2001); hydrological processes that lead to salinity (Ferdowsian et al., 2001); and the behaviour of farmers facing salinity problems on their farms (Pannell, 2001b). His assessment of the new programme was negative

[1] There are two main types of salinity in Australia: irrigation salinity and dryland (non-irrigated) salinity, with the latter constituting by far the majority of the affected area. Dryland salinity is caused by clearing of native perennial vegetation and replacing it with annual agricultural plant species (e.g. wheat, barley, clover, and annual pasture grasses). In Australian conditions, this results in rising groundwater tables, that, in certain areas, mobilise high concentrations of salts already present in the soil profile, causing damage to agricultural land, native vegetation, water bodies and built infrastructure. There are over 2 million ha of salt-affected land in Australia (ABS, 2002) with several million more likely to develop over coming decades (NLWRA, 2001). The most widely advocated mitigation strategy is to replace annual agricultural plants with perennials (trees, shrubs or pastures). Hydrogeological modelling indicates that, in most regions, a large proportion of agricultural land would need to be converted to perennials to successfully prevent salinity (Dawes et al., 2002; NLWRA, 2001) and economic analysis shows that the existing perennial options would be highly costly to farmers if grown on the required scale (e.g. Bathgate and Pannell, 2002; Kingwell et al., 2003). Thus, dryland salinity has a high abatement cost, which contributes to high transaction costs for any salinity programme.

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(Pannell, 2001a). It appeared to have been designed without a sound understanding of bio-physical and socio-economic research that had strong implications for public investments in salinity.

As a result, the authors were motivated to become engaged with policy makers and natural-resource managers to attempt to address the shortcomings of the programme. The focus of these efforts has been development and delivery of tools to assist with decision making about environmental projects, initially the Salinity Investment Framework (Ridley and Pannell, 2005) and the Public:Private Benefits Framework (Pannell, 2008) and later the Investment Framework for Environmental Resources (INFFER) (Pannell et al., 2012; Roberts et al., 2012). In addition, strategies have included: making public comment on existing programmes; presentations to various audiences; research to better understand neglected issue; pilot testing of the decision tools (Roberts and Pannell, 2009); provision of training programmes and user support; participation in committees, reviews and inquiries; and broad communication through web sites and publications. These strategies have been continued since 2000 in an evolving effort to improve decision making about public investment in the environment (as documented at www.inffer.org).

Transaction costs, broadly defined,[2] have been a central issue in this history. Transaction costs have been incurred by a team of collaborators working to address the identified problems. Through our actions, we have imposed transaction costs on people and organisations involved in environmental programmes. We have taken steps to limit the transaction costs involved in decision processes, involving judgements about the appropriate balance between certain transaction costs and the benefits that they can generate. And we have developed methods to account for transaction costs explicitly in the environmental decisions we have analysed (consistent with McCann's (2013–this issue) call for transaction costs to be considered in policy design).

This paper provides descriptions of each of these transaction-cost-related aspects of this history of engagement with environmental programmes since 2000. The aim is to provide a comprehensive picture of the various ways that transaction costs are relevant to (a) decision making and (b) attempts to improve decision making, in such programmes. It is intended to provide insights that may contribute to ongoing development of knowledge, theories and measurement of transaction costs in environmental policy.

While there have been many applications of benefit:cost analysis to environmental issues (Hanley, 2001; Hanley and Spash, 1993; Pearce, 1998; Sunstein, 2005) and there is a growing list of authors who have quantified transaction costs of environmental programmes (e.g. Coggan et al., 2010; Falconer and Saunders, 2002; Falconer et al., 2001; Garrick and Aylward, 2012; McCann and Easter, 2000; Mettepenningen et al., 2009; Ofei-Mensah and Bennett, 2013–this issue), McCann et al. (2005) observe that "transaction costs are not usually included in empirical evaluations of alternative environmental or natural resource policies". This study addresses this gap in the literature. As well as describing how transaction costs have been incorporated in benefit:cost analyses, it also outlines how a balance has been struck between the marginal benefits of more detailed analysis and their marginal transaction costs. An important novel contribution of INFFER is that it embeds benefit:cost analysis within a broader framework that addresses several other identified weaknesses in environmental decision making: the choice of policy mechanism, the logical consistency of projects, the identification of clear outcomes and targets, and the identification and management of knowledge gaps. These elements too require transaction costs to be considered. Further novelties of the paper include that it identifies the potential for some transaction costs to be borne in order to reduce other transaction costs, and that it demonstrates differences between public and private transaction costs in their impacts on the optimal choice of policy mechanism.

[2] Marshall (2013-this issue) defines transaction costs as the resources required to "define, establish, maintain, use and change institutions and organisations and define the problems that these institutions and organisations are intended to solve". This aligns well with the usage of the term in this paper.

2. Incurring Transaction Costs within the Project

Efforts to influence policy and management were motivated by concerns about various weaknesses in the salinity programme. A number of concerns about the programme were raised in official reviews, including a lack of investment in research and development (Auditor General, 2004; Parliament of the Commonwealth of Australia, 2004), poor use of science in decision making (The Senate, 2006), weakness of target setting (Auditor General, 2008), weakness of monitoring and evaluation (SKM, 2006) and failure to achieve the intended large-scale land-use change (SKM, 2006). In our assessment, the core problem was poor quality of decision making about policy design, leading to poor quality of decision making about priorities for investment in environmental projects (Pannell and Roberts, 2010).

When we commenced we had limited knowledge of the decision-making processes we hoped to influence. We found that attempts to influence environmental policies can involve very substantial transaction costs for those attempting to apply influence. Because there is no clear pathway to influence, and because there are so many competing demands on those we would seek to influence (Shaw et al., 2000), one must resort to a diversity of strategies in order to create a reasonable likelihood of achieving change (Pannell and Roberts, 2009).

Since 2000, the portfolio of communication and persuasion methods used has included: preparing numerous media releases and being interviewed for the electronic and print media, resulting in over 100 media appearances; dozens of discussion papers, briefing papers, fact sheets and the like; 230 blog posts, most of them on issues relevant to environmental policy (www.pannelldiscussions.net); actively maintained web sites for relevant projects (e.g. www.inffer.org had 10,000 visits in 2009); numerous meetings, workshops and presentations with policy makers and environmental management bodies (of the order of 100 events per year by members of the team in recent years); development and delivery of a two-day training programme (delivered 17 times to a total of in excess of 500 participants); provision of support, feedback and quality assurance to users of our environmental decision tools (around 35 organisational users); around 20 submissions to government inquiries; membership of more than 10 government committees and panels on environmental policy issues; and publication of research papers in academic journals.

These activities were conducted in conjunction with research on related topics, including development of various decision aids, notably the Investment Framework for Environmental Resources (INFFER) (Pannell et al., 2012). Overall, of the core project team (four people devoting around 2.5 full-time equivalents to the project), the total proportion of time devoted to communication, persuasion, training, etc. since 2008 is estimated to be around 60%. We have been fortunate in being supported by funders who accepted and understood the need for these transaction costs, including the Future Farm Industries Cooperative Research Centre, the Commonwealth Environmental Research Facilities programme, and the Department of Sustainability and Environment of the Victorian state government.

3. Imposing Transaction Costs on Others

Just as the decisions of land managers to adopt a decision support system are influenced by the transaction costs they would bear (Morrison, 2009), the decisions by environmental managers to adopt an improved decision making process would be influenced by the transaction costs involved. Even without use of sophisticated decision-making processes, the environmental programmes we sought to influence already included substantial transaction costs.

To illustrate, in 2008, following completion of the National Action Plan for Salinity and Water Quality, the Australian Government