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INTEGRATED CATCHMENT MANAGEMENT: A ROAD PAVED WITH GOOD INTENTIONS

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“There is clear and convincing evidence that the world faces a worsening series of local and regional water quantity and quality problems, largely as a result of poor water allocation, wasteful use of the resource, and lack of adequate management action...by 2025 two-thirds of the world’s population of 8.3 billion people will be suffering water stress.”

UN Commission on Sustainable Development,
Report prepared for Earth Summit II, New York, June 23, 1997

“For Australia, water is the main constraint - along with soil fertility - to our long-term ecological and economic viability.”

Michael Krockenberger, Australian Conservation Foundation,
Sydney Morning Herald, June 16, 1997

1. BACKGROUND

It is evident from the comments quoted above that attempts by governments around the world to conserve soil and water resources have largely failed. There is a feeling of urgency abroad that a fundamental rethink of the ‘traditional’ expert-driven top-down approach to dealing with these issues is required. One outcome of Earth Summit I held in Rio de Janeiro was international agreement to the UN Declaration on Environment and Development, 1992 (Agenda 21). It says, *inter alia*, that these approaches should incorporate broad public participation and active involvement of non-governmental organisations and other groups.

One such approach is integrated catchment management (ICM). Since the mid-1980s it has been adopted widely around the world under various guises (eg, integrated environmental management, ecosystem management, bioregional management, etc.). Although the focus varies according to guise - ICM concentrates largely on conserving soil and water resources whereas bioregional management, for instance, is concerned more with biodiversity - they each emphasise greater coordination among stakeholders and, to enable this, active participation by all stakeholder groups in making decisions. Specifically, it seeks to overcome past problems with lack of cooperation among government bodies and among land users, lack of coordination between government bodies and resource users, and lack of utilisation of indigenous local knowledge. Despite progress in terms of getting communities and bureaucracies talking, defining problems and goals and setting priorities, frustration is mounting that actions are not following words.

If finding solutions to environmental problems is indeed as urgent as suggested by the statements quoted earlier, then it seems there is little time to waste in evaluating whether Agenda 21-type approaches such as ICM are ever likely to “deliver the goods” as they are being presently applied, or whether fundamental modifications are necessary if they are to be successful.

The aim of my PhD research is to see what economics has to say about such issues. Resource economists have tended to neglect questions of *how* decision-making should proceed, seemingly presuming that alternatives to the ‘traditional’ approach are not sufficiently different or viable to warrant attention. I feel that this is not the case and, perhaps predictably, that the pay-offs from

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economics helping to develop the 'rules of the game' are currently greater than from coaching particular teams in particular tactics.

I will be trying in this seminar to give some sense of how soil and water conservation efforts have proceeded in the past and of how the ICM approach is different. The limitations of resource economics (or at least my understanding of it) for analysing the approach will be discussed. Some ideas derived from other branches of economics will be offered for discussion. Finally, the proposed focus of my PhD research will be outlined.

2. ENVIRONMENTAL DEGRADATION FROM AGRICULTURAL LAND USE

The philosophy of integrated catchment management is now being widely applied, in both urban and rural catchments. In rural catchments some of the environmental degradation is caused by activities in rural cities and towns. There are many forms, and causes, of environmental degradation. In this study I intend to focus on degradation caused by rural land use. This includes soil and stream salinisation, biodiversity decline, stream eutrophication, sedimentation, biocide pollution of wetlands and diversion of 'environmental stream flows' such that breeding of trees, fish and other life forms is disrupted. Various studies have shown rural land use to account for a major share of the total costs attributable to environmental degradation in Australia, reflected in the fact that governments are currently allocating a large share of their 'environmental budgets' to addressing damages with a rural origin.

According to economics, the cause of environmental degradation (at least to the extent that it becomes an economic problem) is externalities. These are spillovers from private activities that are not accounted for in market transactions. For instance, spray drift from one farm to another that damages the production of the second is an external cost if the first farmer does not compensate the second for the damages. Or installation of a recirculation system which avoids downstream yield losses by reducing an upstream irrigator's disposal of pollutants in drainage represents an external benefit unless the upstream irrigator is compensated by the downstream farmers.

The foregoing examples of externalities relate to biophysical spillovers. Externalities relating to the production or collation of knowledge are another reason why an economic problem from environmental degradation might emerge. This can be information about biophysical damage functions or about the costs and preferences of parties contributing to, or affected by, the environmental problem. These externalities arise because knowledge often has characteristics of a public good. (It is important to realise, however, that information available for any decision is likely to be incomplete regardless of whether externalities exist. This is because generating and/or collating information is a costly activity, and a rational decision maker would only undertake this activity up to the level where the marginal benefit from extra information equals the marginal cost. Unless externalities exist, however, incomplete information does not constitute an economic problem.)

Another typical feature of environmental degradation caused by rural land use is the high transaction costs associated with attempts to ameliorate it (or the high chance of government failure if the required transactions are not carried out). Reasons include: (a) the diffuse source nature of much rural-induced degradation makes it costly to identify, negotiate with, monitor and enforce them; (b) the large number of possible degraders, and parties possibly harmed, and their geographical dispersion, has a similar effect; (c) the strong belief by rural land users that their private rights in land entitle them to act as they please (unless adequately compensated) means that there is strong and often effective political opposition to attempts to restrict those rights.

For environmentalists, environmental degradation is typically seen to be caused by a combination of ignorance and apathy, resulting in conservation of the environment being given 'too low' a priority. For economists, however, existing priorities are taken as given - the task is limited to maximising social welfare given these priorities.

However, it seems that a significant focus of programs such as ICM and Landcare is to increase the priority given to environmental conservation. This is attempted by educating resource users and the general public regarding environmental issues and also by 'moral suasion'. In the case of farmers, moral suasion is through promotion of an ethic of land stewardship. It is hoped that this might have the effect of encouraging farmers to consider environmental consequences beyond their own boundaries

when choosing how to behave. Another purpose, although less frequently acknowledged, is to increase the likelihood that farmers will accept interventions which restrict their private rights regarding land use.

The effects of moral suasion on the general public can include (a) increased willingness to volunteer in conservation activities (eg, tree planting), (b) increased willingness for public funds to be allocated to conservation activities, and/or (c) increased political will to restrict farmers' private rights in land use (either by introducing new regulations or more diligently enforcing existing regulations). However, the priorities of the general public can be fickle. For instance, a recent survey by the Australian Bureau of Statistics found that in 1996 only 7.7 per cent of Australians said they were concerned about soil erosion, salinity and land degradation - compared with 15.3 per cent in 1992.

3. THE 'TRADITIONAL' GOVERNMENT APPROACH TO AGRICULTURALLY-INDUCED ENVIRONMENTAL DEGRADATION

Farmers have traditionally been viewed as a manager of nature, extracting a bounty to support continued material prosperity for the nation. The extent of the costs that would eventually arise due to natural resource degradation associated with rural land use was not anticipated when the system of land tenure was established. Private and unencumbered property rights were accordingly viewed as efficient and appropriate. Private property rights to land have therefore implicitly entitled rural landholders to let their land degrade, irrespective of the associated off-site costs. The view that private rights to land take precedence over other types of right has also tended to persist with respect to appeals to common law.

Other reasons why rural land users persist with a conviction that government "owns" environmental problems include (a) farmers have acted in good faith for the good of the nation, and (b) many of the farming practices responsible for environmental degradation have been recommended by government officers (or, conversely, not banned) or supported by government rhetoric.

There has been a strong faith in the ability of scientists and engineers to find technological fixes for environmental problems, and in governments to harness and implement their efforts. The process has thereby been expert-driven and top-down. Indigenous local knowledge has been viewed as relatively unimportant, and changes in land use behaviour have often been viewed as unnecessary.

Engineering solutions have been costly and pressure for smaller government has resulted in a search for solutions with lower costs to governments. Furthermore, hopes by governments that land users would take responsibility for maintaining structures (eg, contour banks) installed at public cost on their land have not generally been satisfied. Also, due to lack of regard for indigenous local knowledge, and lack of coordination of engineering works with actions of local landholders, the engineering approach not infrequently has had perverse outcomes.

As noted previously, education and moral suasion programs traditionally have been relied on heavily as ways of obtaining desired changes in farmer behaviour at relatively low cost to governments. However, these approaches have often been complemented by providing financial inducements to undertake desired actions, such as through subsidies, grants and tax concessions. Education and moral suasion has been found largely to be ineffective in changing behaviour. Changes in attitudes may result, but there is usually little consequent effect on behaviour. For instance, Sinden and King (1990, p. 179) found that "while the stewardship motivation and personal factors encourage perception and recognition of a problem, economic factors promote actual adoption".

Various laws aiming to limit farmers' rights to degrade the environment have been enacted, but they have rarely been enforced. This is despite similar laws having been successfully enforced for other industries. Various reasons for the 'hands off' approach to agriculture might be suggested: public sympathy for the 'plight of the family farm'; effective political lobbying by farmers' groups; capture of regulating agencies by those they are supposed to regulate; the continuing power of the National Party in state and federal politics.

4. INTEGRATED CATCHMENT MANAGEMENT

4.1 Philosophy

The fundamental principles of ICM are: (a) catchments are logical units for natural resource management; (b) land, water and other components of the natural system in a catchment are inter-related; (c) ICM is needed to provide coordination and cooperation among agencies and levels of government; (d) a process is needed to resolve 'edge' problems among agencies (due to overlapping or shared interests); and (e) local communities, as well as government agencies, have legitimate interests in natural resource management.

Active participation by local stakeholders in the decision-making process is believed to be essential, in order to (i) improve access to indigenous local knowledge; (ii) tap into 'grassroots' willingness to volunteer for management or conservation activities; (iii) increase community 'ownership' of environmental problems; and (iv) provide a forum whereby shared goals are more likely to emerge among various stakeholder groups. Its inclusion as a fundamental component of ICM assumes that these benefits will exceed the costs of stakeholder participation, for example due to delays in decision-making.

Effects (iii) and (iv) above would result from 'community development' aspects of the ICM program. They would emerge gradually over time as a result of involving stakeholders in the process of defining problems, setting goals, developing strategies, etc. It appears that what is being attempted is a change in the 'culture' of a population, from one of mistrust among stakeholder groups and ignorance of their interdependencies to one of respect for the viewpoints of others and an appreciation of how their respective interests can be enhanced through cooperation.

4.2 Legitimacy and power

The legitimacy of ICM is supported by legislation in NSW, but only by policy in other states. Even in NSW, however, ICM committees have not been given legislated powers to ensure the principles of ICM are implemented. They must rely on exhortation, peer pressure and their position as a conduit for government funds for conservation projects (and the fact that governments require coordination and stakeholder participation to be built into any application for funds). The rationale was that giving legislated powers would lead to ICM committees being perceived as a fourth tier of government, thus weakening its potential to attract grassroots participation.

ICM committees can of course recommend to government agencies that they enforce existing legislation. To date, however, the traditional reticence to enforce legislation seems to have persisted. In some cases, ICM committees have expressed frustration that government agencies are unwilling to exert the regulatory muscle at their disposal. In general, however, ICM committees have avoided recommending regulatory solutions, continuing to prefer the less divisive (but seemingly discredited) route of recommending education/moral suasion programs and financial inducements.

It is unclear whether coordination among, and participation by, stakeholders to date has been driven more by goodwill as a result of moral suasion, or by the lure of government funding. Regardless of which motive has dominated, however, commitment of stakeholder representatives to voluntarily participating in ICM is being tested by the process often demanding much more time and effort than originally anticipated, as well as by a lack of funds with which to implement strategies (at least where strategies rely heavily on government funds for education/moral suasion programs and grants and subsidies rather than regulations imposing costs on farmers). This 'burn-out' among stakeholders might be likened to 'compassion fatigue' as experienced in recent years by charitable organisations.

4.3 Management means planning?

Among administrators, academics and practitioners working with ICM, *management* is often considered to be synonymous with *planning*. Plans tend to prescribe how resource users in particular circumstances should act. There is even sometimes enthusiasm expressed for a grand hierarchy of plans from the catchment level down to the level of individual properties, with 'best management practices' (BMPs) prescribed for the latter level. However, planning is only one way of managing.

Another way, often favoured by economists (see section 5.1), is to introduce institutions which internalise the externalities responsible for the environmental problem. This approach leaves individuals free to choose how to act in response to the resultant change in the 'market incentives' they face and allows ICM committees to avoid the massive information problem of tailoring BMPs for each of the myriad circumstances within which farmers operate.

The ICM approach has also been dubbed the ICM/Landcare approach since it is often expected by governments that ICM committees will provide a coordinating umbrella under which local action groups (LAGs) (eg, Landcare, Streamwatch, Rivercare, etc.) operate. The local action groups are seen as the 'doers' of catchment management. They perform tasks such as monitoring stream quality and planting trees. This again tends to presume that ICM is mainly about planning what in particular should be done. Of course, LAGs would still have a role under the 'market incentives' approach to ICM; they would be activated when the most efficient way for local resource users to respond to changes in market incentives was by collective action.

LAGs may also serve as a conduit of local knowledge and views to ICM committees. In some cases, however, the relationship between LAGs and ICM committees is tense as the former see coordination by the latter as a threat to their 'grassroots' autonomy.

5. WHAT DOES ECONOMICS HAVE TO SAY?

5.1 Resource Economics

This approach favours use of 'economic instruments' to respecify *private* property rights so that externalities are internalised, but only if benefits are not likely to be outweighed by costs of government failure. Such instruments (eg, Pigovian taxes, tradeable permits) are typically preferred to the standard-setting that is normally integral to planning approaches.

Although resource economists generally recognise the existence of transaction costs, they do not normally account for them when analysing the welfare effects of various policy options. It seems to be implicitly assumed that the transaction costs of designing and implementing each option are identical. It is therefore not surprising that policy recommendations resulting from such analyses are sometimes viewed as ideological rather than based on unprejudiced consideration of the facts.

Resource economists in general have little faith in the efficacy of common property regimes (CPRs) for environmental management. Although it is now recognised that the 'tragedy of the commons' is not inevitable, and there are many examples around the world of successful CPRs, resource economists by and large remain convinced that externality problems can only be resolved by respecifying private property rights, rather than by introducing common rights (in place of open access rights), or strengthening the capacity to enforce them.

Resource economists also tend to have a top-down expert-driven view of the process of governing. If property rights are to be redefined, the allocation should be decided in a top-down manner. Possibilities of delegating powers of defining rights to parties closer to the 'bottom' are not considered. One such possibility, for instance, may involve the government allocating 'common rights' to discharge pollutants among the various ICM committees. Under this scenario each ICM committee would be free to decide how to ensure its constituents acted such that the aggregate pollution level permitted by the common right was not exceeded. This might involve ICM committees 'breaking down' their respective common rights into individual rights, or committees might instead decide to maintain CPRs and rely on mutual assurance (otherwise called goodwill, trust or social capital) among constituents for adequate compliance.

Resource economists typically view financial incentives as the only incentives strong enough to induce significant changes in behaviour. They tend to overlook or discount the potential to modify behaviour by strengthening 'psycho-social' incentives for farmers and other stakeholders to internalise their externalities. This is notable since it seems that development of such non-financial incentives (via moral suasion, peer pressure, etc.) is critical to the rationale for the ICM and Landcare programs.

It is also important to note that resource economists take the priorities of the general public at any time as given; it is presumed that individuals' preferences are paramount and that each individual is the best judge of what s/he prefers. The ICM and Landcare programs take a different stance: sometimes individuals' priorities are sufficiently different from society's (particularly when future generations are to be taken into account) that governments are justified in using various means including leadership and moral suasion to lessen the gap. This latter position involves a subjective leap that economists are unwilling to make. Resource economists need to be aware of this philosophical difference when undertaking analyses of such programs.

Although resource economists recognise that externalities in information provision (due to information often being a public good) are, through exacerbating information deficiencies, an important contributor to environmental degradation, their focus nevertheless tends to remain on problems associated with biophysical externalities. Moreover, where they do address information problems, their assumption of government as a top-down expert-driven process tends to predispose them to recommending solutions consistent with the diffusion model under which information is generated by experts (researchers) and is disseminated to farmers via extension agents; that is, resource economists tend to recommend that information deficiencies be addressed through formal research. However, other models of the information process stress the critical role of farmers as partners with 'experts' in the research process - as a consequence of their own ingenuity as well as their accumulated indigenous local knowledge. Since the ICM and Landcare approaches are predicated strongly on these partnership models, it is timely for economists to account for insights from such models when framing recommendations regarding policies for addressing information deficiencies.

Finally, resource economics seems ill-equipped to assess the role of 'community development' or 'community building' in addressing environmental degradation. Since, at least according to the rhetoric, this is a critical component of programs such as ICM and Landcare, ideas from other strands of economics, and/or from other social sciences, will be important in analysing this aspect of these programs. From a resource economics perspective, for instance, the way the decision making process arrives at recommending a policy option does not matter. From a community development viewpoint, however, the way that the decision making process proceeds is vitally important - the aim from this perspective is presumably to design the process so that various community development objectives are achieved en route. Such objectives might include learning; community empowerment (but what does this mean - is it analogous to self-esteem but at the community level?); building trust among different stakeholder groups; achieving recognition among stakeholder groups of their interdependencies and shared goals; developing peer pressure for individuals to act in the community interest.

Nevertheless, resource economics offers a number of important insights into why problems are arising with the current approach to ICM. These include:

- a. Education alone cannot be depended upon as a way of getting farmers to voluntarily internalise their externalities. For a voluntary approach to work, education would need to be complemented by effective moral suasion. However, few resource economists would envisage that moral suasion could ever be so effective.
- b. Attempts to achieve coordinated decision-making among stakeholders will often be undermined by free-riding - since a large share of the benefits will be external to the party/s attempting to initiate coordination.
- c. Attainment of communal action targets (eg, x thousand hectares to be sown in aggregate to perennial grasses) is likely to be undermined by free-riding unless the ICM process has developed strong mutual assurance among land users.
- d. Planning interventions are often more information-costly than market-based interventions and thereby more prone to government failure.

5.2 The transaction costs school

Most if not all of the above limitations of resource economics as an approach to elucidating the role of ICM appear to stem from its neglect of transaction costs as an impediment to coordination among stakeholders in an environmental problem - regardless of whether lack of coordination is the result of market or government failure. ICM emerged as a result of widespread recognition that lack of coordination (or 'integration') among stakeholders to environmental problems was seriously undermining private and public efforts to address these problems. It was apparent that given the

rewards from various parties pursuing self-seeking objectives and the transaction costs of achieving coordination, coordination would not occur without institutional reform. As was argued in Marshall *et al.* (1996), ICM can therefore be viewed as an institutional innovation designed to promote prospects of coordination among stakeholders by reducing the transaction costs involved. The PhD project aims to build on the ideas in that article, and hopefully also to undertake empirical analysis of the effects of ICM on key variables affecting transaction costs.

According to Coasian logic, externalities persist because the transaction costs of establishing markets to internalise them *voluntarily* are prohibitive. Thus there are calls for government intervention to modify property rights using various means so that externalities are *coercively* internalised. However, as we have seen above, attempts at government intervention have had limited success, for reasons including information deficiencies and strong political opposition by farmers to attempts to curtail their private rights. Each of these reasons can also be viewed from the point of view of transaction costs of attempting to change property rights being prohibitive.

In the long run, however, there are possibilities for reducing transaction costs, thus improving prospects for externalities to be internalised as a result of markets arising or effective government intervention becoming more feasible. As with any other type of cost, society can reduce transaction costs over time by investing in development of technologies and institutions (which can be thought of as social technologies). Governments have typically taken this role due to the public good characteristics of such technologies/institutions (eg, currency, standards for various measures, law-making, etc.). Decisions to implement ICM programs can be viewed in this light.

In particular, ICM can be viewed as an institutional innovation attempting to reduce transaction costs by facilitating collective action and collective negotiation. As noted previously, transaction costs of individuals resolving agriculturally-induced environmental problems are typically very high. Transaction costs can, however, be lowered by individuals combining into 'clubs' representing their respective interests. This can reduce transaction costs by: reducing lines of communication; spreading overhead costs; allowing specialisation of tasks; and building mutual assurance.

However, forming clubs, deciding on and enforcing constitutions and rules, and running club affairs, involves transaction costs. Free-riders will shirk their share of these costs where it is to their private advantage and thus undermine club effectiveness. These transaction costs can nevertheless be lowered by governments investing in institutions facilitating such collective action. This is what governments appear to have attempted by developing organisational structures and rules for ICM, legitimising ICM committees as representatives of local communities and giving ICM committees considerable influence over how government research funding is allocated among projects within their respective catchments.

Various literatures from economics will be useful for elucidating the potential for government to achieve welfare gains by facilitating collective action as characterised above. These will include those relating to collective action, clubs, cooperatives and not-for-profit firms.

5.3 Institutional economics

Despite the broad parameters set by governments for ICM committee operation, there remains considerable scope for each committee to adapt how it operates according to local circumstances such as culture, types of issues to be dealt with, etc. The distinctions in institutional economics between formal and informal institutions, and between institutions arising spontaneously (as a result of 'invisible hand' processes) and by design, are relevant here. Whereas legislation or policies underpinning an ICM program constitute formal and designed institutions aiming to guide how the program will evolve in the various situations where it is adopted, success of the programs is likely to depend in large measure on the informal institutions that arise spontaneously during the process of committee meetings, public meetings, community activities, etc. Social conventions regarding acceptable conduct represent an important category of such institutions.

Unlike with resource economics, therefore, the nature of the process whereby problems are addressed is recognised by institutional economists as having considerable economic significance. Institutional economics is therefore more likely to be useful in trying to understand the role of the ICM process (eg, active stakeholder participation). From this perspective it may be possible to integrate concepts such as

'community ownership' (of environmental problems) and 'community development' within the economic way of thinking about ICM. This perspective may also assist in elucidating economic thinking about the scope over time for governments to delegate certain powers to ICM committees (once, for instance, their constituent communities have 'developed' sufficiently).

6. PROPOSED RESEARCH FOCUS

I propose to explore the potential of ICM to contribute to resolution of agriculturally-induced environmental problems by reducing the transaction costs of coordinating or 'integrating' the efforts of the various parties with a stake in these problems. ICM will be viewed as attempting to reduce transaction costs by creating a new set of institutions designed to facilitate collective action in response to these environmental problems. This will require development of an appropriate theoretical framework (to a large extent synthesised from existing theories regarding collective action, clubs, cooperatives, etc., as well as theory from the new institutional economics). Lichbach (1996) seems a good place to start. The direction of empirical investigation remains unclear at this stage. It is likely to involve testing the validity of certain key assumptions underpinning the philosophy of ICM (eg, the implicit assumption that participation by stakeholders in the management process increases mutual assurance and thereby reduces problems with free-riding). Some ideas for empirical tests are provided in chapter five of Sandler (1992).

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