Policies for soil conservation in New Zealand: options for government

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Information Paper No. 31

[1] Visiting Fulbright Scholar, 1990

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Lincoln University

August 1991

Centre for Resource Management
P.O. Box 56
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CANTERBURY

ISSN 0112-0875
ISBN 1-86931-096-9

The Centre for Resource Management is a research and teaching organisation spanning the campuses of the University of Canterbury and Lincoln University in Canterbury. Research at the Centre is focused on the development of conceptually sound methods for resource use that may lead to a sustainable future. The Centre for Resource Management acknowledges the financial support received from the Ministry for the Environment in the production of this publication.

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Preface

This publication comprises part of a research project commissioned by the Ministry for the Environment as part of the 1989/90 Environmental Research Agenda. The research has the objective of identifying and evaluating new options that will align and make explicit costs and benefits of land management practice. The present monograph highlights government policy options. A companion report has been produced by the Centre for Resource Management: *Policies for soil conservation in New Zealand: the institutional setting,* by Peter Ackroyd.

The opportunity to prepare this publication was afforded by a grant from the New Zealand-United States Educational Foundation under the Fulbright Scholars' programme. This grant enabled the author to spend six months at the Centre for Resource Management learning about land management issues in New Zealand during 1990. A report was submitted to the Ministry for the Environment and to reviewers for their consideration. On returning to the United States, comments were incorporated and this publication compiled.

Acknowledgements

The author appreciates, without implication, the encouragement of J.A. Hayward, the comments of R. Bartlett, B. Sharp and T. Williams, and especially the guidance of P. Ackroyd in the preparation of this publication. The support of the New Zealand-United States Educational Foundation and the Centre for Resource Management is gratefully acknowledged.

CHAPTER 1

Soil and land degradation

In the field of soil movement, New Zealand is a world leader.[1] The nation's youthful ruggedness, its steep hills and mountains, its active glaciers and frequent earthquakes, its bracing winds, and its torrential storms all contribute to exceptionally dynamic soil. But natural factors are only the beginning. Deforestation and introduced plants and animals -legacies of human settlement - have accelerated the process.

Small amounts of soil move almost continuously, displaced by moderate rains or winds. However, the majority of soil movement is due to extreme storms or winds. Both the continuous and the extreme events cause losses of fertile topsoils and accretion of unwanted sediment, but only the extreme events cause sudden and pronounced structural changes as well - large gullies, sediment fans, and landslips or slides that expose gaping scars. The structural changes are particularly worrisome. Affected land can quickly become unsuitable for further cultivation or pastoral use, and its stabilisation can be quite expensive.

Infrequent, large-scale movements of soil cause the greatest damages both on- and off-site. The large losses may occur only once or twice in many decades and are easily overlooked in annual land management decisions. Even very conservative soil management plans are vulnerable to ill-timed episodes.

The very nature of soil movement presents challenges. The phenomenon is widespread and affects many people. It is also complex, with obscure causes and consequences. The underlying processes work cumulatively over long periods. Soil movement is extremely difficult to measure outside the laboratory, and widespread monitoring would be prohibitively expensive. The physical circumstances vary greatly from place to place, as do the appropriate remedies.

Soil movement is a social concern, first, because it tends to reduce natural productivity (Crosson and Stout, 1983). The reduction sometimes can be offset with fertilisers, irrigation, and other inputs, but the added costs are a loss to society unless they are exceeded by the costs of prevention. Second, displaced soil impinges on other resources. It smothers seed beds and destroys crops, clogs ditches and streams, displaces water storage capacity in lakes and reservoirs, and degrades aquatic ecosystems (Clark *et al.,* 1985).

The government of New Zealand has a long history of encouraging agriculture and land settlement.[2] As part of these policies, various programs also encouraged soil conservation. In recent years, however, the Crown has withdrawn to a very large extent from its previous support for agriculture, with soil conservation being one of the few exceptions (Sandrey and Reynolds, 1990). Now soil

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1 For an overview see: Murray and Ackroyd (1979), Adams (1980), Soons and Selby (1982), and Griffiths (1981).

2 See generally Jourdain (1925), McCaskill (1973), National Water and Soil Conservation Authority (1987) and the summary in Ackroyd (1990, pp.2-7).

conservation policies are being reconsidered (National Water and Soil Conservation Authority, 1987; Horner, 1990).

This publication assesses government involvement in soil conservation, including the reasons for and against it, policy instruments that are available, and the roles of central and regional governments. The discussion applies only to soil conservation on private lands -those not directly held by government.

The discussion begins with a definition of the public interest in soil conservation. The context within which policies must be evaluated is then described and specific policy options are assessed. The assessment emphasises economic issues. While there are no prescriptions, there are conclusions about the policies that seem most sensible.

CHAPTER 2

The public interest and public policies

2.1 Two goals

Conserving soil is an accepted goal in most developed nations, for two reasons. One reason is to ensure that ample soil remains available to sustain agricultural production capacity and meet future food and fibre needs: the other is to reduce the off-site damages caused by displaced soil.

These broad justifications are easy to accept; making them operational is much more difficult. How much agricultural capacity is enough, and can it be sustained by fertilisation rather than conservation? What are the 'future needs' and what obligations do present citizens have to provide them? How should unmeasurable considerations be weighed against those that can be measured? Should the public sector be directly involved in soil management, or should it simply facilitate private decisions? If it is to be directly involved, should government encourage or regulate? Should its involvement come primarily at the local or national level? Different stances on these issues can lead to very different conclusions about whether and how government should promote soil conservation.

2.2 Past policies in New Zealand

Successive New Zealand governments for many years subsidised and protected agriculture (Sandrey and Reynolds, 1990). One form of support was soil conservation assistance (see the Soil Conservation and Rivers Control Act, 1941). Drawing on national tax revenues and local rate funds, catchment boards provided communities and individuals with technical and financial assistance for conservation practices. Project costs were also shared by landholders. The assistance has gone more toward protecting soil quality or preventing off-site damages depending on the government philosophy of the moment (Ackroyd, 1990).

In the restructuring moves of 1987-90, catchment board activities were absorbed by regional councils (National Water and Soil Conservation Authority, 1987; Horner, 1990). The restructuring requires regional leadership in catchment works and reduces the programmatic involvement of central government.

In addition to direct assistance, special tax provisions encouraged resource conservation investments by farmers. Tax code changes in recent years have cut out most of the special inducements (see for example Tyler and Lattimore (1990)).

Central government also supported data development, research, and other essential knowledge and infrastructure for soil conservation (Jakobsson, 1986). This involvement continues within an environment of increased contestability and reduced security of funding (Parliamentary Commissioner for the Environment, 1988).

Other government programs have sometimes thwarted New Zealand's soil conservation efforts. For many years, central government cleared public land, seeded it for agricultural uses, then leased or sold it to 'balloteers' on concessionary terms (McCaskill, 1973). Much of the balloted land was highly vulnerable to degradation. Much of it was remote or otherwise economically marginal. Water development schemes required low grazing intensity or bush cover in certain areas (for example, Department of Lands and Survey, 1977), but the consequence nonetheless has been more fragile land in risky uses.

Disaster assistance has been another influential policy (Dickinson and Sandrey, 1986; Trotter, 1988). Central government has regularly provided financial, material, and technical relief following storms, droughts, and seismic events. The assistance has been particularly beneficial to pastoral activities in areas with high risk of drought, land slips, and erosion. Landholders have in effect received disaster insurance without charge. Much of the land could not generate enough income to sustain the costs of preventing or recovering from disasters and would probably revert to bush or be put into forestry if public disaster assistance was withdrawn.

Taken together, the conservation, settlement, and disaster relief policies have been costly for taxpayers and the economy. While some landholders and commodity merchants have benefitted, the policies have increased and retained vulnerable land in risky uses and have reduced landholder incentives to manage resource degradation risks.

2.3 Policies in other countries

Many nations have voluntary soil conservation programs aimed primarily at farmers. The usual approach is to disseminate information, offer technical assistance, and provide part of the cost of conservation measures.

In recent years, the voluntary approach has been widely criticised.[3] The many dollars spent and many farmers helped have not produced equivalent resource protection. Part of the problem is that conservation and other programs help to sustain the very land uses that put the land at risk. Another part is that the programs have emphasised protection of productivity for the future when correcting off-site problems has a more compelling justification.

The criticisms have led to new approaches (see generally Braden and Lovejoy (1990); some involve regulations. In many parts of the United States, for example, soil must be confined and stabilised during construction projects in order to keep soil off neighbouring properties and out of water bodies. Some states have gone as far as to set erosion standards for farmland in order to retain fertile soils.[4] In Denmark, manure spreading is restricted and fertiliser management plans and nutrient-using autumn cover crops are required (Dubgaard, 1990).

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3 For criticisms of New Zealand policy see: The Treasury (1984). For criticisms of United States policies see: Braden and Vchtmann (1982-83), Williams (1979), United States Comptroller General (1983), Clark *et al.* (1985), and Strohbehn (1986).

4 The states of Illinois, Iowa, Ohio and South Dakota have erosion control laws for farmland.

Other approaches involve forceful incentives. An example is *Conservation Compliance* in the United States (United States Department of Agriculture, 1986). Farmers who have erosion-prone fields or wetlands must adopt and implement conservation practices or be ineligible for certain types of government benefits. Thus, benefit eligibility carries a higher price. The motives for this policy include both productivity protection and off-site damage mitigation, as well as providing a stronger rationale for government assistance to farmers. Another example of incentives is Sweden's fertiliser tax that aims to reduce nutrient pollution (Kumm, 1990).

In addition to the new strategies, tactical changes are evident. Soil conservation initiatives are increasingly being considered from a regional perspective, as befits off-site problems. Sweden has refashioned extension programs to address entire watersheds (ibid.). Australia's Murray-Darling Basin Compact (Musgrave, 1990) and LandCare program (Government of Victoria, 1988) exemplify regional approaches to water and salinity management.

The restrictive policies are particularly important, because they explicitly change property rights. The fact that they have been justified both to protect future citizens' access to productive soils and to protect current citizens from soil pollution is interesting because of landholders' very different positions with respect to the two goals.

Upon closer examination, however, there are important differences in restrictive policies. The United States' construction requirements and Denmark's manure controls are the most restrictive, and both deal with pollution. The policies that attempt to protect productivity are either voluntary (the United States encumbrance of farm benefits) or enforced only when government helps with the costs (state erosion restrictions).

The recent developments reflect wide-ranging changes in public attitudes toward soil conservation - less reliance on voluntary action; greater interest in off-site consequences; decentralisation of policies and programs; sharpening of the policy instruments to make programs more effective; and increased willingness to get tough with resource degradation, rather than simply encourage voluntary conservation.

CHAPTER 3

Property rights and soil management

3.1 Property rights

Property rights are entitlements to make certain types of choices. An absolute property right in land, for example, would allow the owner to use that land in any imaginable way. Some property rights are enshrined in constitutional law, others in civil law, and still others have evolved in common law.[5]

While a property right confers a certain autonomy and freedom of choice, it also implies boundaries where the choices of one person give way to the choices of others. That is, attendant to a property right are certain duties and obligations not to use the right in ways that harm or interfere with the rights of others.

Private landholders in most times and places have exercised absolute rights over the management of soil. This rights structure has very different consequences for maintaining productivity and minimising off-site impacts.

3.2 Property rights and productivity

Future citizens have no more legal standing than current citizens give them, so there is no legal basis for a claim that current landholders have a duty to provide for the future. Thus, duties and obligations are confined in time.

However, landholders have a direct financial interest in the future condition of their land. Better tended soil should sell for a higher price or provide advantage for one's heirs. Thus, landholders' economic self-interests are consistent with the goal of protecting productivity (Crosson and Stout, 1983; McConnell, 1983). The main requirements are, first, that landholders are assured of realising the future value of their land and, second, that the land market provides good information about the quality of land parcels and the relationship of soil quality to future productivity.[6]

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5 Only the latter two forms of rights are present in New Zealand, which has no constitution.

6 For empirical evidence on the value of land quality in the United States, see Ervin and Mill (1985) and Palmquist and Danielson (1989).

3.3 Property rights and off-site impacts

The virtues of self-interest in safeguarding future productivity have no counterparts when it comes to off-site impacts. Soil dischargers typically have only a small stake in the outcome. Property values will increase little if at all from abatement,[7] unless it is widely undertaken, and abatement rarely generates revenues.[8]

While direct self-interest fails, it would seem that the duties and obligations associated with property rights surely extend to the off-site consequences of soil management. Victims clearly have standing to claim damage compensation through common law litigation. The threat of such actions should induce precautions by landholders. But a closer look reveals this approach to be a mirage. It fails because of the costliness of establishing cause and effect and bringing the parties together.

Liability could be a very effective remedy when the problem is well defined and the parties are small in number and easily engaged. Then, the costs of undertaking a tort action may not be unreasonable compared to the possible benefits, and the visibility of the participants will ease the apportionment of the costs. The unpleasantness of neighbours suing one another, however, is likely to discourage many from pursuing recourse.

More generally, land-based pollution arises from multiple sources and affects many people. Each victim would reap only a small share of the benefits from abatement and has an interest in shifting the costs of litigating onto others. Each polluter is practically immune from being detected because so many nearly-indistinguishable sources are involved. These realities undercut common law protection.

It is certainly true that these endemic problems could be diminished through the application of appropriate doctrines of liability.[9] Strict liability fits instances in which pollution is an aberration and victims are relatively powerless to prevent damages. Such liability has been upheld in a number of environmental torts.[10] Because of the inevitability of some land-based pollution, negligence (standard of care) seems to be a more plausible doctrine. But, since victims can often anticipate off-site impacts and take some precautions (such as not building on flood plains), a contributory negligence standard could reasonably be applied.

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7 Exceptions arise, for example, when farm chemicals pollute an aquifer that serves as the farm water source and when eroded soil fills the farm drainage ditches. In these cases, the costs and benefits are internalised to a large degree within the farm enterprise.

8 Government subsidies are sometimes offered to cover part of the costs, but they generally do not make abatement profitable. Landholders could offer their abatement services on the open market in order to realise a profit, but rarely are victims of land-based pollution well enough organised to purchase those services.

9 See generally Rubin (1977), Polinsky (1980) and Shavell (1984).

10 *Boomer v. Atlantic Cement Co.* 26 N.Y. 2d 219, 257 N.E. 2d 870. 309 N.Y.S. 2d 312 (1970); *Walker v. Weedair (N.Z.) Limited* [1959] NZLR 777. See also discussion in D.A.R. WILLIAMS, ENVIRONMENTAL LAW, 222-233 (1980).

A more vexing aspect of the liability regime is the involvement of many parties on both sides of a particular conflict. Because the perpetrators cannot easily be singled out, liability would have to be joint and several.[11] That is, all potential culprits would have to be liable as a class, irrespective of their specific contributions. This structure treats the good and the bad alike, and in so doing, creates incentives for self-policing within the class. But it also creates costly and time-consuming wrangling over criteria for inclusion and over division of responsibility among defendants.

The involvement of many victims suggests that class actions should have legal standing. Once again, however, criteria for inclusion and for distributing the financial risk can be costly and contentious.

With such problems of organising a case and developing sound information, even under creative liability doctrines, the costs would be prohibitive unless large damages are at stake. But, the physical harms associated with land-based pollution typically are not of the life-threatening or heart-rending sorts that lead to large awards. Only in rare instances would the benefits be worth the costs. This fact undercuts the common law incentives for landholders to guard against off-site effects and leaves all of the incentives for precaution on the victims.

Some commentators argue that continuing off-site impacts are *prima facie* evidence that the costs of disciplining private actions exceed the value - that the equilibrium allocation of resources within a given set of property rights is efficient even though it includes external impacts (Buchanan and Stubblebine, 1962; Buchanan, 1972; Sammuels, 1971 and 1972). Surely some externalities are not worth correcting under any circumstances. But this misses the point and ends up in a tautology. The structure of rights frequently throws all of the disciplinary ('transactions') costs on one side - in this case, the side of the pollution victims (Dahlman, 1979; Bromley, 1978). If these costs are systematically greater for the parties on one side than for those on the other, then different structures can produce very different outcomes, any one of which would be 'efficient' within its context. The issue then is the structure of rights, not merely the absence of transactions within a given structure.

A case can be made for organising rights so that the onus of correcting misallocations is on the side that can do it most cheaply (Calabresi and Melamed, 1972). In the instant case, for example, it might be cheaper to protect victims by enforcing land use or water quality standards but allow individual landholders to gain the agreement of nearby residents to less stringent requirements.

3.4 Civil law alternatives

Where common law remedies are very costly, slow, and, consequently, incomplete, civil law may be a better alterative. Government defines or asserts specific rights, duties, and obligations and undertakes their defence. This, of course, is also costly, and it can cause resource misallocation by forcing disparate situations to adhere to a single set of requirements.[12] Furthermore, civil laws

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11 Segerson (1988). However, she assumes the ability to differentiate polluters' relative contributions to off-site conditions. See also Tietenberg (1989).

12 This can be avoided to some extent by allowing latitude in the application of civil laws.

can be criticised as arbitrary, uncompensated seizures of private property rights.[13] In some cases, however, the distortions of civil law remedies may be less than the distortions arising when common law is called upon to do a job for which it is ill suited. Child labour, driving, and prophylactic quarantine laws are good examples.

Most nations have laws establishing explicit rights to a clean, healthy environment. The effect is to uphold through the enforcement powers of the state certain duties and obligations that could easily be ignored in the course of economic activity that is incompletely accountable through common law remedies.

To date, these laws generally have had the greatest impacts on industrial activities and the disposal of solid and sanitary wastes. Land-based activities have been subject to zoning laws that, among other things, typically govern household waste disposal options. Land-based pollution of the non-point source type has only begun to receive civil law recognition.

Policies embedded in civil laws are implemented through some combination of:

- economic incentives;
- regulations;
- education and persuasion; and
- administered markets.

Complementing these instruments are indicators designed to gauge whether policy objectives are being achieved.

Economic incentives are created through subsidies, tax provisions, charges, fines, and liability (insurance). They alter the benefits and costs of various choices that are available to individuals but do not prescribe outcomes. In contrast, regulations specify outcomes by setting standards, issuing directives, or requiring permits. They directly confine choices. Education and persuasion aim to change individuals' perceptions of their own self-interest. The principal vehicle is public information. Administered markets allow private transactions over goods and services not otherwise captured in the market place. Government is more closely involved in administered markets than in normal markets because the goods - such as clean air - have special characteristics that are not easily reduced to individual property rights.

Many public initiatives combine instruments. For example, administrative markets are actually a combination of quotas, established by regulation, and incentives, created by allowing quota rights to be bought and sold. Another example is the use of penalties to reinforce regulations.

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13 Anderson and Hide (1989). See also Knetsch (1983). The argument in a nutshell is that compensation would assure that the beneficiaries value the rights at least as much as those whose rights are seized. But, the common situation is that the duties and obligations attendant to rights are not being observed and common law remedies are too costly. Compensation would effectively have 'beneficiaries' paying to restore the rights that they are supposedly guaranteed anyway by the duties and obligations incumbent on, but ignored by, those whose rights are being 'seized'. For differing views, see Bromley (1989).

CHAPTER 4

Soil conservation policies for New Zealand

The following sections include discussion of possible directions for government policy toward soil movement. This discussion is warranted by doubts about the adequacy of common law remedies to resolve particularly the off-site impacts of soil management. To be clear, however, I do not claim that civil law remedies are clearly superior or necessary; such a claim would require empirical support that is simply beyond obtaining. But, empirical support for the adequacy of common law is equally unavailable. It is a matter of political judgement whether the gaps in common law require filling with civil law. And this judgement must take into account the consequences for liberty, individual security, and compensation - values that market and common law solutions generally uphold.

4.1 Laissez faire

One approach for government is to withdraw from programs that affect conservation incentives and to rely instead on market forces and common law remedies to determine the extent of conservation. This would not preclude non-government organisations from engaging in conservation (or degradation), owning and administering conservation areas, entering into conservation agreements with landholders, and so forth; it would simply remove government.

Laissez faire would give full expression to property rights and common law remedies. Self-interested landholders would safeguard soil quality according to their reading of its future value and prevent off-site effects to the extent dictated by the (meagre) threat of damage claims.

There are secondary considerations. One is that asset values would change. Land that stood to benefit from government programs would be reduced in value in their absence, and *vice versa* for land restricted by government programs. Land that has inherent productivity and stability advantages would rise in value relative to fragile and low quality land. The economic positions of individuals and regions would rise and fall with these changes.

Another secondary consideration concerns basic information and research within a laissez faire system. General information on the natural resource stock has limited private value but much public value. Individuals are unlikely to contribute voluntarily toward the compilation of this information. The situation is analogous for basic research, much of which increases public knowledge without directly resulting in marketable products. Government provision of basic natural resource information and research is widely accepted as necessary.

4.2 Education and technical assistance

Many nations, New Zealand included, have programs designed to inform landholders about soil conservation advantages and techniques. Some landholders also receive design and implementation assistance. Various studies have analysed the importance of education and technical assistance in promoting conservation (for example Cambeni *et al.* (1990), Ervin and Ervin (1982) and Van Es (1983).

These measures appeal to landholders' self-interest in protecting asset values. By encouraging landholders to consider seriously the value of conservation, public education efforts may be a worthwhile supplement to market incentives. On the other hand, the conservation consequences of these voluntary programs are frequently short-lived (United States Department of Agriculture, 1980).

Government is not be the only source of conservation information and assistance. Professional farm consultants and technical services already provide soil management expertise. Government education efforts might reach further if directed at the providers of these services - realtors, insurers, lenders, and consultants - with the aim of building soil conservation considerations into lending, real estate, and management transactions.

Education and assistance have less to offer for off-site problems. Off-site problems often call for coordinated action by several landholders, but voluntary programs lead to uneven uptake; many landholders avoid involvement with government programs or do not want to hear that they are contributing to off-site impacts. A way around this would be to offer greater assistance for groups prepared to take coordinated action - this is the concept of the LandCare Program in Australia (Government of Victoria, 1988), and has long been a feature of the United States Soil Conservation Service's Small Watershed Programme (Lea and Mattson, 1974). Nevertheless, uneven results can be expected as long as the programs are voluntary.

4.3 Facilitation

If distortionary policies of the past encouraged intensive use of fragile lands, then removal of those policies should eventually result in reversion of much of that land to less intensive uses. Ordinarily, the reversion would happen in a patchwork pattern. Individual landholders would reach different conclusions at different times. A result could be slow adjustment that fails to accentuate the economic comparative advantage of a region.[14]

Some analysts suggest that government could facilitate the transition and promote synergies that would enhance future prospects (King, 1990). This might be done through speeding up land re-titling, adjusting surveying criteria, reducing stamp duties, and operating a clearing house for information (Steele, K., Ministry for the Environment, 1990, pers. comm.). Government could even buy and redevelop land (King, 1990).

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14 King (1990). See also the related studies: Aldwell (1989), McIntosh (1989), and Centre for Community Initiatives (1989).

There is little doubt that government policies and procedures can affect economic development and land use. But, the virtue of this approach is less clear. Private interests can go far toward promoting change. They have a comparative advantage in generating ideas and bearing the risk of investments. By working with those interests, government can foster cohesive development while capitalising on the special talents of the private sector. Through rating or infrastructure development, government can encourage certain types of change, again, without supplanting private interests.

4.4 Subsidies

In many nations, governments have subsidised certain types of conservation measures without contractual assurances of future performance.[15] This approach invites diversion of public funds to non-conservative uses, and it promotes one-off measures where sustained practices are needed.

Rather than subsidising specific land use measures, government could reward actual improvements in land or water quality. This would promote the actual objectives rather than contributing factors. But, the improvements would typically take many years, and the rewards would have to be large and assured in order to attract the interest and investment of landholders or communities.

No matter how cleverly organised they are, subsidy schemes have perverse consequences. They encourage beneficiaries to make things look bad initially so that the rewards of improvement can be achieved easily. Accountability is difficult - people seek the funds for purposes only tenuously related to the program. And subsidies keep more of the problem-causing enterprises in business and seeking assistance.

4.5 Purchasing rights

Government could pay landholders to give up rights to certain land uses. This is common in practice. For certain types of conservation measures, government assistance depends on a multi-year contractual agreement during which the landholder gives up (sells for the price of the assistance) the rights to manage in ways that are inconsistent with the conservation measures.

This approach could be expanded in duration and scope. For example, landholders might be paid for accepting deed covenants that permanently disallow ploughing or grazing near a stream.

While continuity with past policy and opportunities for landholders are advantages of purchasing rights, past drawbacks would also be manifest. A comprehensive policy would be very costly, and a less comprehensive policy would be piecemeal. The government could also end up owning lots of rights that it could not effectively administer.

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15 For comments on New Zealand's experience, see Hide and Sharp (1987). See also United States Department of Agriculture (1980).

4.6 Cross-compliance

Rather than giving outright subsidies, government might use other government benefits to reward those who practice conservation or attain certain levels of land or water quality. Disaster relief for farmers is the obvious (and perhaps the only) remaining benefit in New Zealand that might be encumbered.

Large scale natural disasters present a major challenge to representative government. It cannot stand idle in the face of serious and highly visible losses to large groups. Rather, it responds with assistance.

By acting as an insurer, government reduces private incentives to manage the risks. It also undercuts the development of a private market for disaster insurance. It is not clear that government has any comparative advantage as an insurer. But, if government disaster relief is unavoidable, there may at least be ways of structuring it so that landholders and regions manage more of the risk of soil movement.

One approach would be to have several levels of disaster coverage: the lowest level for all individuals or regions without condition to fulfil the expectation that government will provide some type of assistance; higher levels for those who have protected themselves against losses. Eligibility for higher benefits might depend, for individual landholders, on implementation of certified soil management plans. Communities might be eligible for aid if they are following an approved soil and water management plan or maintain more than a specified level of per capita expenditure on resource protection.

Use of disaster assistance in this way would loosely follow the example of the Conservation Compliance program in the United States (Farnsworth *et al.,* 1988). This program affects all farmers who cultivate land classified as 'highly erodible', plus certain other lands. To be eligible for agriculture program benefits (including several types of de facto insurance), the farmers must establish and comply with a conservation plan. The plan must be approved by the United States Soil Conservation Service.

For cross-compliance to work, there would have to be a credible threat of receiving only the basic disaster benefits. Otherwise, landholders or communities would have little incentive to qualify for higher coverage. Credibility is established most persuasively through experience and observation. But, with disasters, experience and observation are sporadic. Thus, credibility would depend on a convincing political consensus. Advanced coverage options would have to be sufficiently attractive to overcome doubts.

Cross-compliance would probably increase government fiscal exposure. Higher levels of disaster assistance would probably mean higher total disaster payouts. The payouts would be difficult to anticipate and budget for because they are occasioned by the vicissitudes of nature. Binding contracts with individuals or communities would leave government less able to protect its budget by trading off the size of payments against the scope of the disaster. Of course, the risk of high payouts could be spread in a secondary insurance market or absorbed in a revolving trust account.

Another danger would be the undercutting of both conservation *and* disaster incentives. This possibility always threatens when a single policy instrument (disaster assistance) is aimed at multiple

objectives (insurance and conservation). Landholders who are unwilling to undertake conservation might opt out of the disaster assistance that they really need. Or, serious conservation problems might occur on land where disasters are not a big concern. Only where the need for disaster insurance is highly correlated with the presence of conservation problems is cross compliance likely to be very effective.

4.7 Rates

A bigger step away from pure subsidies would be the use of punitive incentives. An obvious mechanism is to levy higher rates for degraded land or land that is yielding pollution in order to increase the cost of degradation and thereby discourage it.

This approach has more to offer for pollution than for loss of land quality. Rates are (loosely) justified by the value of public services received, and pollution is essentially the use of a public service (waste disposal). A rate factor that reflects the cost of dealing with the waste would be consonant with the philosophy of rates. On the other hand, the public and private impacts of productivity loss are (nearly) the same, so the public service rationale does not apply.

In practice, adding a pollution-impact component would further complicate the already complex and politically volatile rate system. Furthermore, the intended incentives would probably be lost by combining this component with others in the overall rate.

4.8 Regulations and fines

An even more forceful approach would be to regulate land use and levy penalties for violations. New Zealand law allow for regulation of land use for the purpose of soil and water conservation (Soil Conservation and Rivers Control Amendment Act, 1959 ss. 34, 35). Government can place temporary or permanent restrictions on individual landowners in the public interest. In reality, however, these regulations have rarely been used (Steele, K., pers. comm.).

Regulations limit private rights. Government's power to regulate stems either from the absolute powers of the sovereign, as in New Zealand, or from its powers to safeguard public order and well-being.

Insofar as regulations usurp rights previously held by individuals, they take things of value. Compensation for losses ensures that the rights are worth at least as much to the beneficiaries of regulation as to those being regulated (Anderson and Hide, 1989; Knetsch, 1983). Without compensation, there is no such assurance.

In some cases, however, regulations essentially lend government authority to existing duties and obligations that are not enforceable through common law. For example, many environmental regulations essentially assert civil law protections for duties and obligations that have proven too cumbersome to enforce through common law remedies. They substitute administrative enforcement for liability proceedings. Such uses of regulations cannot really be said to reduce private rights; rather, they provide different means of enforcing existing rights (Braden, 1982). In these circumstances, compensation has little justification.

Regulation is fundamentally an *ex ante* effort to anticipate and prevent problems. It is part and parcel of the 'planning approach' to governance. In contrast, fines and liability are *ex post* instruments that come into play only after problems occur. They create incentives to avoid problems without creating elaborate and time-consuming government machinery to scrutinise every possible source of trouble. Both approaches have shortcomings, which is why combining them can sometimes work better than either alone (Kolstad *et al.*, 1990).

A system of regulations and fines for on-site degradation would require criteria for reasonable rates of land quality change or appropriate uses.[16] These judgements are made everyday in urban areas through zoning and the criteria are set and enforced without compensation. However, relatively few nations extend zoning to rural areas.[17] The apparent premise is that lower intensity and greater homogeneity of rural uses breeds fewer conflicts. Moreover, with respect to future productivity, the fact that future claimants have no legal standing undermines the rationale for zoning-type intervention.

Nevertheless, some nations systematically regulate land use in rural areas (Grossman and Broussard, 1988). Land use compatibility is one rationale. An alleged public interest in the aesthetic quality of the countryside is another. Within New Zealand, for example, interest has been expressed in encouraging plantation forests to be structured in ways that create more diverse and interesting vistas (for example, O'Connor, 1986). It might be argued that landslips and gullies promoted by unwise land uses violate aesthetic sensibilities and should be prevented through regulation.

The legitimacy of a public interest in aesthetic quality is certainly open to debate. The point here, notwithstanding the sweeping provisions of New Zealand's soil and water conservation law (Soil Conservation and Rivers Control Amendment Act, 1959 ss. 34, 35), is that this is one of the few justifications for regulating land uses because of on-site impacts. Doing so might prevent the most egregious degradation, or at least provide civil recourse when it occurs. But, it also raises the question of compensation, reduces security of landholder rights, and may increase the costs of soil-intensive products. These consequences may in some cases be counterproductive.

With respect to off-site impacts in rural areas, conflict and heterogeneous interests are obvious. The dispersed nature of the conflicts provides plausible grounds for civil law intervention.

Ideally, regulations aimed at off-site impacts would be based on the quality of the environment. Criteria would be set for water quality, and violators would be penalised. However, individuals often do not know how their actions contribute to ambient conditions, so they would not know how to respond to regulations based on those conditions.

Government has two ways of dealing with uncertainty about the relationship between emissions and ambient conditions. One would leave it to the landholders to resolve. If the expected fines are large enough, it would be in the landholders' interest to investigate the relationships. The other approach would be for government to investigate and then to translate the ambient criteria into emission

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16 In the United States, states that regulate soil erosion employ the 'Universal Soil Loss Equation' (Wischmeier and Smith, 1977). Erosion standards are set, but compliance is based on whether the equation indicates that the farming methods being used would generally attain the specified standards, not whether they actually attain the standards in a particular situation. To apply this approach in New Zealand would require good predictive relationships for New Zealand conditions, and these are presently unavailable (Steele, 1990).

17 For an exception, see Grossman and Broussard (1988) on the Netherlands.

criteria for individual landholders. Because of the difficulty of measuring emissions, however, the criteria would probably have to specify land uses - like Denmark's requirements for nutrient management (Dubgaard, 1990), or perhaps pesticide use restrictions or filter strip requirements near water courses.

A basic problem with regulations and fines is the fractional chance of being caught for violations. The consequence is that landholders or communities have less incentive to comply. The policy choice is between primitive fines (a cost to violators) and more enforcement (a cost to government) (Polinsky, 1980).

In contrast to rates, fines get around the need for continual and systematic reassessments of land uses, land quality, or water quality. Enforcement can be based on self-reporting, spot checks, and complaints, as is the case with most environmental regulations. Since the reason for the fine would be very clear, it would send a clearer message to landholders than would an adjustment in rates.

4.9 Transferable permits[18]

A permit scheme for erosion (and perhaps for fertiliser and pesticide application) would specify a given rate of loss (use). Landholders who want to use the land more erosively would be required to buy more permits from those who can use the land with less erosion.

This approach has a serious flaw when applied to soil movement. Compliance would have to be based on long-term land use plans (so all land uses would have to be continually monitored and recorded). But, if permits can be exchanged, the land use plans also can change. So, there is no sound basis for determining at a point in time whether the individual is complying with his or her long-term plan. The scheme also implies equivalency of erosion from area to area, but the consequences for both productivity and off-site effects can differ greatly.

While an erosion scheme seems implausible, transferable permits might work for fertilisers and pesticides. In these cases, total use is an important element (although not the only determinant) of environmental impact. A transferable permit system might limit the use while allowing market forces to allocate it.

An input or emission scheme has obvious limitations as a way for dealing with off-site effects. A pollutant load scheme would be better. But, land-based emissions do not have a fixed relationship to loadings, so the effects of transfers between landholders cannot readily be anticipated.

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18 See generally Tietenberg (1985). Applicability to non-point source pollution is suggested by Harrington *et al.* (1985).

4.10 Conclusions

Government has many tools available for promoting soil and water conservation. In the past, it has relied on voluntary and unfocused efforts. Regulations have been available but almost entirely unused. The result has been sporadic, uneven, and has enjoyed only short-lived success.

Government policies toward soil and water conservation should align more closely with public justifications of their capabilities. Protecting productivity is in the landholder's interest to a significant degree. Government policy should build on those interests rather than substituting for them. Providing good information and research to landholders and their support industries makes sense. Cross-compliance with disaster relief makes sense. Facilitating economic change makes sense. But, regulatory intervention does not make sense unless there is a clear case of a public threat in the way land is being used.

When there are such threats, as with impacts on receiving waters, more forceful steps are justified and often required because of common law limitations. An essential first step is to clarify what constitutes unacceptable impacts of soil and land management. Then, it makes sense to enhance access to common law remedies by expanding the liability doctrines that enable tortious relief. It makes sense to have regulatory powers available for use in situations where private or common law remedies are inadequate. And, it makes sense to have penalties for abuses that encourage landholders to see prevention as being in their own best interest.

CHAPTER 5

Who should take the lead?

Government restructuring in New Zealand is shifting many functions from central to regional jurisdiction. This section addresses jurisdiction over soil conservation programs.

5.1 Central government

Central government is ostensibly responsible for advancing the general health, welfare, and prosperity of the entire nation. In most developed countries this responsibility includes conserving natural resources and protecting environmental quality.

Among government units, central government has a comparative advantage in the collection of revenues (Oates, 1972). Citizens and businesses can relocate to low rate jurisdictions within a nation more easily than they can relocate to low tax nations. High local taxes promote out-migration and undercut the tax base. The usual solution to this revenue problem is to collect taxes centrally but administer the funds locally.

Central government is also best placed to devise institutions through which diverse regions can settle their differences. One important category of problems involves inter-regional commerce. By preventing trade barriers among regions central government promotes specialisation that lowers costs and increases economic welfare. Another important category is environmental problems. Where pollution travels from one jurisdiction to another, central government provides a forum for negotiating and enforcing a solution.

Central government also has a comparative advantage in the provision of basic information and research. Businesses and smaller jurisdictions often cannot capture all of the benefits and so have less incentive to provide these goods.

Finally, central government has an advantage in pooling the risks of major disasters. At the local or regional level, disasters are rare and difficult to predict. Resources set aside for relief may go unused for decades. At the national level, disasters occur with greater frequency and it is easier to justify having relief resources constantly at hand. This is not to say that government deals with risks more efficiently than the private sector or that local entities are unimportant in the implementation of relief programs. But, if the public sector is to be involved, centralisation of resources has some advantages.

How do the advantages of central government relate to soil and water conservation? First, they suggest merit in national environmental quality objectives - minimum conditions to which the citizens of all regions are entitled and which will not be hostage to covert inter-regional economic

competition.[19] For example, central government could set specific minimum nationwide water quality criteria, or it could reduce the share of national tax revenues going to a region that fails to adopt certain minimum standards.

Second, central government can establish uniform protocols for information about natural resources and environmental quality. Standardised, long-term data are important for monitoring resource trends, conducting research, and assessing policies. In order to ensure the quality and consistency of data collection, central government may have to pay for these services or maintain staff in all regions.

Third, central government can support basic natural resource research of national significance.

Fourth, as the logical government provider of basic disaster relief, central government can make suitable connections between disaster policies and soil and water conservation.

Finally, central government can use its fiscal advantage to collect a significant share of the government funds for conservation policies. It obviously should fund the programs over which it assumes primacy - water quality standards, for example, but also can use national funds to reduce fiscal barriers to regional policy development.

5.2 Regional government

The chief advantage of regional government is its proximity to local interests and concerns (Oates, 1972). It can tailor national objectives to meet local needs, and it can establish policies and programs for special regional circumstances.

Regional government's overriding responsibility is to promote the welfare of citizens within its jurisdiction. This sometimes involves competition with other regions for economic or political resources held by central government. The competition can occasionally be destructive. One region may be reluctant to regulate pollution, for example, because industry might relocate and remove jobs, income, and government revenue from the region (Rowland and Manz, 1982). In many such instances, the regions would all be better off with a common set of basic protections, which is where central government plays a vital role.

Water quality standards provide an example. Regions can compete for industrial development by cheapening their water resources. Efforts to set some common protections for water probably await the action of central government, if only to insist that all regions establish their own standards.

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19 On the potential for competition, see: Rowland and Manz (1982) and Leonard (1988).

Regions probably have more autonomy with land use standards, because the inherent capabilities of land are immobile. Moreover, in the long run, a region that enhances its inherent productive capacity will have a stronger economic base, so a region has a competitive interest in minimising degradation. Education and extension to promote the consideration of land quality information in land markets and consultancies are examples of initiatives that regions could reasonably undertake. While regions stand to gain relatively through such programs, their investments also serve the national interest in remaining competitive internationally. Thus, it would make sense to use national funds to promote regional conservation policies - perhaps through central government grants for policy development followed by matching grants for program operations.

CHAPTER 6

Summary and assessment

Four of the policy instruments identified above seem worthy of serious consideration: facilitation and information support, cross-compliance with disaster assistance, standards for water quality, and liability.

Liability is the starting point. Through common law remedies, private citizens can reinforce the duties and obligations of landholders to prevent off-site damages. Government can play a role by making those remedies more accessible. Access will be enhanced by setting suitable evidentiary standards for non-point source pollution, by establishing liberal grounds for class actions, and by expanding the applicable liability doctrines (Miceli and Segerson, forthcoming).

While they are a starting point, common law remedies are unlikely to resolve adequately soil and water degradation, for the reasons outlined above. Other instruments more actively involve government.

Disaster relief for farmers has been a major policy quandary in recent years. Large sums have been expended to rejuvenate farms in highly vulnerable areas; areas that may never be stabilised unless farming gives way to forestry. Moreover, agriculture's disproportionate claim on disaster aid is difficult to justify.

A political intention to continue special disaster relief for farmers could at least attach conservation as a *quid pro quo*. Farmers whose resource management is not certifiably conservative could be excluded from the extra assistance. Further research is needed to assess farmers' willingness to participate in such a scheme, the cost implications and risk management options for government, and administrative procedures.

Water resources are so important in New Zealand that the near-vacuum of criteria for their use is surprising and alarming. Water quality standards would set goals against which actual conditions can be measured and would be a basis for action when conditions are unacceptable. Periodic monitoring, self-reporting, and a complaint process could provide reasonable enforcement. Standards would have to be backed up with penalties for noncompliance.

Regional governments are unlikely to adopt water quality standards that interfere with economic competitiveness. Central government needs to define basic criteria that are to be met everywhere.

Strong programs of basic research and information are essential to expand knowledge of natural resources, to solve resource management problems, and to keep all parties informed about the quality of resources and improved management possibilities. Central government is the obvious leader in this area as well. But, regions can play an important role in seeing that those who influence the management of land are well-informed about their self-interest in resource conservation. They can also use their role in land transfers to expedite changes that will promote conservation.

The preceding instruments have sound economic and public policy justifications. But, in reality, they are only part of the picture. New Zealand is one of many nations that employs land use standards, despite the less obvious public policy rationale.

Land use standards can be useful in providing guidelines for landholders. Not all landholders fit the 'rational' model that predicts idealised behaviour which will yield appropriate conservation. Some landholders will do more than needed, some less. And few will make the extra effort to mitigate off-site impacts. On the other hand, bureaucrats are unlikely to be better at determining the 'best' land management techniques. It would be unwise to harness the rural landscape in the constraints of traditional patterns of centralised planning. Rather, the best use of land use standards is as a last resort to resolve especially egregious problems without the necessity to prove specific connections to off-site problems or rely on private recourse through common law.

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