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Chapter 11: Designing a program

In Chapter 2 we used a regional example to illustrate the challenge of sustainable resource use, and in particular to highlight the challenge of path-dependence such that it is hard for any part of the system to change, unless the whole system is changed. We indicated how the compounding effects of the many decisions, and decision-makers involved in resource use and management makes pursuing sustainability a complex negotiation. Instruments to encourage sustainability must acknowledge that self-interest, limited knowledge, and beliefs counter to sustainability are part of the negotiation equation. In such a context it is highly unlikely that any one instrument will achieve desired changes. Rather, sustainability programs should address a number of parts of the system simultaneously, using a variety of instruments and transition supports.

Program managers have an enormous range of instruments to work with. We have provided detailed explanations of these and many examples in the preceding seven chapters. They range from intervention in real markets, through to creating artificial markets, to private and public regulation, and to the use of economic and information supports to aid the required transitions. The problem is not finding an instrument; it is ensuring optimal selection and integration of instruments within a program that is focused directly on systemic changes in behaviour.

In designing their programs, managers should take into account the following considerations

1. The allocation of costs and benefits, with an eye to the economic and cultural patterns promoted by the strategy;
2. The need to pursue social justice and equity needs of society;
3. Path dependence, which limits the capacity of people and organisations to change; and
4. Recognising that government is limited in its capacity for implementation of systemic change.

We will discuss these issues before moving on to an examination of integrated strategies to pursue sustainability.

Design issue 1. Social impacts

Even apparently benign instruments can cause subtle or gross behavioural changes within natural resource use systems that cause significant secondary effects. Cumulatively, these secondary effects can cause marked social change to:

- Culture, such as perceptions of freedom and restraint within society, or attitudes to authority and neighbourly relations.
- The pattern of funds flow and the accumulation of wealth, the degree of social equity which prevails, and economic growth.
- The extent to which innovation and entrepreneurship are rewarded, and the degree of investment that will be made in environmental entrepreneurship.
- The amount of pressure on the public purse.

It is not sufficient for the designer of a social change program to worry about the effectiveness of the instruments that they choose to use. It is also important that they consider the cumulative impact of their program on all of these aspects of society.

Table 11.1 highlights the types of behaviours promoted by different approaches and how instruments allocate the social cost burden. Program designers should keep in mind that the structure of the mechanisms themselves affects social outcomes, even beyond the resource and information flow that may be associated with their use.

Table 11.1: Mechanisms, costs and behaviour

Instrument type	How does the instrument work?	What behaviours are promoted?	Who bears the cost?
Markets	Through market transactions <ul style="list-style-type: none"> - the price of scarce resources increases; - consumption is therefore curtailed by choice or inability to pay. 	Market entrepreneurship <ul style="list-style-type: none"> - trading or - improved resource access or value. 	Consumer of the resource bears the cost of consumption
Private Regulation	Through private litigation, <ul style="list-style-type: none"> - harmful effects are compensated for. - harm to third parties is therefore curtailed by the choice to avoid risk. 	Avoidance of third party harm and “neighbourly” negotiation of interests	Offending user bears costs of avoidance of harm. Affected neighbour may bear costs of unavoided harm. Both bear negotiated costs.
Public Regulation	Through penalisation: <ul style="list-style-type: none"> - Specified behaviours are made expensive. - Consumption is therefore curtailed by choice to avoid risk. 	Compliance, focused on least cost to avoid the risk.	Regulator bears the costs of enforcement. User bears the cost of compliance.
Incentives	Through contract: <ul style="list-style-type: none"> - Desired behaviours are rewarded; - Conserving behaviour is thereby promoted. 	Administrative entrepreneurship to <ul style="list-style-type: none"> - win grants - satisfy requirements 	The granting agency plus grant applicants under cost sharing.
Education	Through communication: <ul style="list-style-type: none"> - Attitude or knowledge change leading to - Conserving behaviour. 	Civic responsibility	Volunteers who adopt the learning.

Design issue 2: Social justice and equity

Incremental improvement in resource use efficiency will not achieve sustainability. Non-use of the declining unused environment will also have to become more valuable, as a buffer against incomplete knowledge and future needs, and as a means for disciplining resource waste. If we do not protect substantial unused areas, we will suffer unexpected harms. (Perhaps the best indication of the need to protect unused areas is rainforests, where it is clear that they do make a major ecological contribution but the key to that contribution remains in leaving them relatively untouched).

Increased valuation of unused environmental resources is a path that we are already treading. Environmental uses once free have become priced. Water contamination or

waste dumping carries an increasing financial cost (either risk of penalty or a price for disposal). Private land erosion is no longer a matter of private concern alone, riparian areas are becoming valued for their non-use values, and the price for their production use is increasing as controls become tighter. These are not one-off affects; they are acting out a market imperative to increase the price of unexploited resource as their supply diminishes - and as we become aware of this.

One effect of our past consumption and our increasing population is that there are fewer freely available resources for anyone to use. Even for those of us 'baby-boomers' can recognise that when we were children there were more untouched areas to explore and exploit than are available today. The strategies we use to conserve and promote the more efficient use of this declining resource, coupled with the fact of overall environmental decline, further reduce this availability and embed potential problems of social justice and equity. This is a difficult issue that needs direct attention, as virtually any strategy to conserve or increase the efficiency of use of natural resources will add to the problem of lack of free access.

Inequity impacts of sustainability intervention

Market competition is a force to transfer wealth and opportunity from the less economically successful to those who can exploit more efficiently. Competition shifts resources from those unable to maximise wealth to those who can. Those who can are often those with the capital to invest to allow technological solutions to be implemented, and with the information access and education to manage a more technologically and capital-intensive production process. Growing inequality is undesirable but it is not an accidental by-product of a thrusting and competitive market, and regulation accelerates the problem reducing resources available to the less well-endowed by prohibiting many uses and strengthening private property interests.

In capitalist systems, pursuit of social equity generally requires redistribution, typically through taxation. This requires moving resources from the most economically productive to uses that are not as directly economically productive. The danger is that this can reduce the total wealth available to support the disadvantaged, reward the advantaged, and invest in protecting and developing our natural capital. There is a difficult circular relationship between wealth and disadvantage, even when the goal is reallocation to the less well off.

In most jurisdictions, including Australia, pursuit of sustainability also requires controlling access to natural resources through regulation and market-based exclusion. This means restricting economic or social use, and in many cases reallocating opportunity to the wealthy who can afford the increasing costs of access as supply is constrained. This underlying equity problem requires radical innovation that will enable social equity and justice to be strengthened within an increasing technology and capital intensive resource use regime, and where free access to natural resources is constrained. Sustainability, economic growth and social equity each place different demands on natural resources. Sloppy thinking about the relationship between these demands can result in counterproductive interventions.

Example: Intervention and social problems

We sometimes hear the argument that it is possible to assist marginal regional communities and contribute to conservation by implementing tradeable water allocations untied to land. But this strategy has broad social effects, not all of which are positive. If farming in a region is of marginal economic value, local farmers may choose to exit production if they are able to sell their water rights. If rights to water are untied to the land, decisions regarding water rights are separate to decisions to sell land. Less profitable owners may sell their water interest, lease it, or hold it as an asset for later sale. They may choose to trade their right to another region. As the production activity of such landowners reduces, the regional economy suffers.

If the policy aim is community development (as distinct from entrepreneur enrichment), then a different instrument approach may be needed¹. This could include the use of regional ‘bubbles’, limits to trading outside geographic boundaries, or restriction of trading to short term leasing of water. Alternatively pursuit of social equity may require a distinct strategy, accepting that the water trading will add to regional viability problems. Reliance on the one instrument to achieve all three aims (social equity, economic growth and sustainability) is a naïve strategy.

Equity requires fair distribution and ownership of the fruits of natural resources. In Australia this means that we need to make choices about natural resource management instruments within a framework of three overlapping considerations:

1. Achieving integrity in the way in which Aboriginal interests are reflected in our natural resource use system - as in other aspects of society;
2. Creating opportunities for less advantaged individuals to have meaningful and enjoyable lives; and
3. Ensuring that communities who might otherwise be disadvantaged have sufficiently robust economic and social infrastructures to support the people living within them.

Design issue 3: Path dependence

Why is it that we so consistently overshoot the sustainable level in our use of natural resources? We can easily point at greed and stupidity as the culprits, but, realistically, we cannot accuse all the people who try to use the land sustainably and fail have these vices. We might be better off to acknowledge that our ability to use resources sustainably is constrained. In Chapter 4 we described the nature of the constraints, citing the experiments by Moxnes with fishers and herd managers. To quote Moxnes:

There seems to be a general tendency that decision makers misperceive feedback in that they undervalue the importance of delays, misperceive the workings of stock and flow relationships, and are insensitive to nonlinearities that may alter the strengths of different feedback loops as the system evolves.....

¹ See for example San Francisco Chronicle *Farm Bill kills farming* Carolyn Lochhead , Monday, May 20, 2002 *As costs rise, bigger farms buy up smaller farms. Small family farms begin to disappear. Agriculture consolidates into enormous industrialized operations covering thousands of acres. The countryside depopulates. Towns vanish.*

(Moxnes 2000, p327)

We can explain the causes of failures to make sustainable choices by examining factors in the decision-making system:

Information flows - affected by complexity, filters and time.

Natural resource yields are the result of many elements that vary widely. Physical elements – seasons, temperature, rainfall, presence of other species, and the interactions of all of these - alone cause yields to fluctuate, providing poor signals for resource managers to respond to. Add to these natural fluctuations that changes in management techniques, such as the application of new technology or the restructuring of holdings, and we create situations that mask declining yields due to environmental degradation. When the accumulating injury is so great the system can no longer compensate, the ecosystem collapses.

Capital commitments lock in exploitation.

Natural resource managers use capital and technology, such as bigger, more sophisticated vessels, sophisticated herd management and genetic manipulation, to increase natural resource yields. Such investments increase the fixed capital commitment of the resource user and financial obligations become locked in by borrowing. Decline in production triggers more intense use, as repayment of the capital becomes the driving concern. For many the freedom to reduce pressure on the ecosystem is available only at enormous personal cost.

Beliefs contribute to depletion.

Beliefs are the heart of the resource overuse problem. Changes in beliefs occur slowly in response to new information and patterns of reward. Beliefs form filters against disconfirming information. James Doyle reviewed the psychological literature on cognitive systems and concludes:

Psychologists have documented a wide variety of errors and biases in people's observations of data, and the judgments and interpretations based on them, that result from "bounded rationality". For example, when deciding what evidence is relevant to testing a hypothesis, people often ignore crucial information such as base rate probabilities and potentially disconfirming information. When examining data, people often perceive correlations that are not there, fail to perceive strong correlations that are there, perceive patterns in data that are in fact random, and see what they expect to see whether it is there or not. When drawing inferences from data, people sometimes conclude that the data supports their theory even when it strongly supports the exact opposite theory and are too willing to base firm conclusions on information that is incomplete or unrepresentative.

(Doyle 1997).

The belief in hard work and more investment as a solution is normal with farmers, fishermen and others who work directly with nature. Such beliefs combine with the lack of economic rewards from "non-use", and the funding pressure of past investment, to provide a further barrier to reducing demands on the natural system.

Decision-making structures contribute.

The decision-making structures of resource users are not always well suited to making the complex linkages and difficult choices to change their relationship with the natural world. Even ignoring the sometimes limited educational opportunity for resource use communities like farmers or fishers or miners, such decisions are not ones that can be readily made even with good education and information. As we have already highlighted, the signals are confused, the strategies far from certain, and the requirements to achieve change are not easy to accommodate. System problems require appropriate thinking frameworks that, even among well educated people, are not common.

Insufficient time to learn and respond.

The experiments by Moxnes' show that even when harm from resource use is evident, change to ameliorate the harm is still difficult to achieve:

In reality, there is an additional and time-consuming process of developing and agreeing on institutional arrangements. This process is likely to further delay the necessary actions, hence worsening over investment and overexploitation. In addition, the double-loop learning required to develop institutions to solve the problem is likely to be weak. New institutions depend on agreement among resource users, politicians, and in many cases the electorate. Many of these actors have limited knowledge, and in many cases, weak incentives to spend time and money on learning. Thus they are likely candidates to suffer considerably from the misperceptions revealed in my studies. With threatened interests at stake, considerable frustration, and incongruent views of the problem, it is no wonder that the process can take too long, be violent, and lead to less than perfect policies.

(Moxnes 2000, p333-34)

It makes no difference in substance whether we are talking about boat-owners dragging up seagrasses as they anchor over diminishing *Posidonia* seagrass beds, a farmer continuing to clear lands even as the economic return declines, or a city person choosing to water their garden while the catchment suffers from drought. Those on an unsustainable resource-use path are often locked in to behaviours they have little incentive or knowhow to change.

Path dependence can lock a society into economic structures that do not satisfy either its economic or social goals². Changing the path requires a lot more than the desire to do so. It often means:

- flying in the face of conventional wisdom;
- putting up with the ridicule of being seen as impractical;
- taking on the risks of innovation;
- not being able to access appropriate local knowledge and expertise; and

² For an excellent summary of the field see (Marceau, Manley et al. 1997), particularly Chapter 4.

- doing so without the infrastructures that others who follow the main path enjoy.

The case of Earth Sanctuaries provides an interesting example of the problems of change in an environment not sympathetic to that change:

Earth Sanctuaries Ltd (ESL) is the world's first publicly listed company with the core business of conservation. Listed on the Australian Stock Exchange in 2000, ESL restores and manages natural environments to conserve Australian wildlife.

In its brief life it has encountered legal problems in being allowed to keep and conserve endangered species, major stock market compliance issues in achieving listing, and has been engaged in ongoing debates over proper accounting methods for valuing its wildlife 'assets'. Recently it has undergone a restructure in the face of financing difficulties, but it still survives as an illustration of the coming together of markets and conservation.

It should not be surprising that pioneering efforts are often unsuccessful. What is more surprising is when they are successful. The key to changing a society and an economy lies in adjusting the resource and knowledge structures of the economy, and shifting the emphasis from the old to the preferred economic structure. It also lies in building complementary assets like appropriate capital structures, investment mechanisms, educational institutions and markets to ensure that those who do begin to make the change have access to what they need to be successful. Above all, it requires that there be sufficient incentives to individuals to overcome the risks that are perceived in any change.

Design issue 4: Limits of government

Private market activity is an exercise of the right of an owner to set price, and to control access as a privilege of ownership. Most people have a personal interest in defending their freedom, as owners of property who wish to see their own rights respected. Violation of an owner's right is not undertaken lightly, whereas outwitting the government can be the matter of pride and hero worship, much celebrated in our history.

Regulation relies on technical description, through law. It is complex, wordy, and subject to debate and interpretation. For the most part, ownership is culturally understood and rights and obligations accepted as the natural order of society.

The uptake of government incentives can be constrained by suspicion, and/or unwillingness or inability to cooperate with administrative requirements. These can be unwieldy or discomfoting to those who are unused to or intolerant of bureaucracy. Government incentive schemes are tax-dependent for their funding, and therefore will always, directly or indirectly, encounter resistance to increasing the share of total wealth distributed through government.

Regulation is not self funding for government, neither are incentive schemes. Government investments in sustainability compete with national defence, social security, healthcare, the arts, industry development and a myriad other demands on the public purse.

Market instruments involve a balance of "wins" and "loses", since for every buyer there must be a seller, and for every expense to someone there is an income for someone else. There is generally someone with an interest. This is not always the case

for government initiatives. Promoting green taxes or increased expenditure on the environment is rarely a recipe for political success. It may be possible to vote in a regulation, but voting in the expenditures to make the regulation effective seems to be far more difficult.

The creation of a market instrument is by definition a creation of wealth. Since some resource has now been given a fiscal value, every transaction that follows is a further input into the measured economy, it is GDP. International credit agencies and comparative charts of economic performance positively assess the resulting effort for the protection of the environment. Company accounts of those firms that take advantage show the benefit of doing so.

Economies and firms that are measured as efficient attract more capital at lower cost than those who are less favoured. They are courted as trading partners, and attract the economically successful. By contrast, government activity like taxes, regulation and government funded incentives represent a drain on this artificial measure of success. Since what is measured and rewarded in the international sphere is growth in GDP, a reliance on non-market mechanisms, all other things being equal, is a tax on opportunity of the citizens of a state.

Such matters can be overstated. Attitudes to government and regulation are not fixed, and different societies have different views. The creation of a book value creates with it an obligation to deliver an economic return on investment such that an increase in book value increases pressure on performance. In the long run what will tell is the underlying quality of the natural resource, the integrity of the governance systems, the quality of the society and the creativity of people.

For every complex and intractable problem there is a simple answer. Sadly it is almost always wrong. Appealing solutions like more regulation, more government incentive schemes, or greater specification of use privileges as property right, all suffer from this limitation. The problems are complex and intractable, and human behaviour is subtle. Needed reforms will have systemic effects and need to be tailored in their design to the situation and to the specific problem to be resolved.

Fundamental design principles

Our discussion so far outlines the required performance criteria for institutions and instruments to deliver sustainable resource use. The size of the sustainability gap, the impact of the tyrannous equation, and the limitations of the capacity for sufficiently effective action by government determine these requirements. We have no choice but to pursue a path of innovation above all, and within that framework to put in place more efficient institutions and more effective safeguards than we have today.

First.

The approach must stimulate significant innovation in economically productive resource use at two levels:

1. A transition to a technology and services intensive economy, reducing the strain on natural resources to produce wealth.
2. Achievement of far greater economic value from the resources that we do harness, including more sustainable consumption patterns as well as more efficient use of natural resources in production.

Second.

The approach must stimulate significant innovation in the protection of resources that are not essential to efficient and profitable production, at four levels.

1. Reducing perverse subsidies and preventing inadequately priced spillover effects of both production and consumption;
2. Reinvesting substantial resources in the protection and rehabilitation of environmental capital to allow future natural service benefits to flow;
3. Creating effective safeguards against undesirable uses of the environment, including:
 - a. Unpriced or insufficiently priced use of resources;
 - b. Mismanagement or catastrophic accident;
 - c. Cumulative incremental harm to the environment.
4. Halting institutional failure by those agencies charged with protecting and/or rehabilitating our natural capital.

Third.

The approach must minimise the cost to government, by

1. Making the role of government that of maintaining the integrity of the natural resource management system including:
 - a. Managing population, industrial development, social support and other policy settings within a framework of sustainable resource use, not as independent considerations.
 - b. Integrating a central emphasis on practical action on sustainability into all government communications and resourcing, and into resource use by government,.
 - c. Ensuring that the public have unambiguous information about the condition of our natural capital, the rate of its depletion, the implications of that depletion, and the directions for change that are required to ensure sustainability;
 - d. Providing a strong safety net against failure of voluntary and market instruments, and against increased harm to the environment, and ensuring that this net strengthens if pressure on these resources increases;
 - e. Ensuring that the agencies responsible for controlling resource use activities are sufficiently resourced, with clear incentives and accountability, so that the underlying limits to use are respected.
2. Regulating with integrity, which requires that funds available for implementation match the demands of implementation, and that as funds availability shifts, regulatory instruments are redesigned to fit resources.
3. Managing transaction costs in the mix of instruments that shape resource use behaviour, by:

- a. Designing regulatory instruments that use transaction costs (including the default cost of failure of regulation) to discourage environmental harm;
- b. Ensuring that transaction costs systematically discourage those activities that have the potential to harm the environment.

Fourth.

The approach should be designed so that those whose behaviour is being targeted can readily access and understand information. This requires:

1. Reducing administrative complexity including rationalisation of the range of regulations and administrative and consultative bodies;
2. Redesigning processes using quality system concepts to minimise administrative complexity;
3. Investing in transparency and providing real access to environmental, policy and regulatory information for the community;
4. Providing full public accountability for outcomes relative to policy. This requires that natural resource policy have clear outcomes specified, measured and reported.

Fifth.

Innovation and investment in the delivery of social equity. This requires

1. Acceptance that the operation of markets, and the needs of sustainability, can cause inequity, and a firm commitment to social equity as a distinct aim of natural resource management;
2. Social equity objectives for natural resource use be clearly defined, including specification of national goals for:
 - a. Embracing Aboriginal interests in natural resources;
 - b. Protecting access and use opportunities for all Australians; and
 - c. The health, welfare and opportunities of disadvantaged communities, including regional towns and villages.
3. Development of funding mechanisms associated, whenever possible, with market initiatives and economic opportunities through natural resource use, to provide an economic base for achieving social objectives; and
4. Modification of natural resource management instruments, both regulatory and market, to ensure that they do not add to the difficulty of achieving social equity goals.

Summary of the design challenge

The sustainability task is not a subset of the challenge of economic growth, nor does it inherently conflict with it. Sustainability requires a shift to using intellectual capital rather than materials in wealth production. It requires sufficient wealth to restore and conserve our natural capital. Strategies for sustainability can be the basis of new wealth such as tradeable interests, services to maximise the conservation and the efficient use of resources, and industries based on more efficient use and conservation.

In these ways there is a close alignment between the environmental and economic growth agendas.

However sustainability is not fully aligned with economic growth, nor will economic growth guarantee sustainability. Economic growth fuels consumption, and consumption drives further pressure on the environment. Improving resource productivity will align with sustainability only if dividends of that efficiency are paid to protecting or restoring the environment.

Neither is sustainability (or economic productivity) inherently aligned with social equity. Through increasing pressure on natural resources, technological and capital intensity in resource use, and protective management of the remaining unused resource, both sustainability and economic growth involve limiting access. This must mean fewer opportunities for the less privileged, and less opportunity to be generous in sharing the resource.

None of the three goals of sustainability, wealth and fairness can be achieved within the present paradigms of resource use and resource sharing, nor through the ineffective natural resource governance system we currently use. Innovation in technology has to work with innovation in social institutions to encourage entrepreneurial behaviour in the interests of the environment. Whilst technological innovation is often lauded, innovation in social institutions is perceived as risky since it means disrupting a status quo to which we have grown accustomed. It is more comfortable to believe that we can keep the structures intact and somehow achieve different outcomes. The saying “a fool believes that they will get a different result through doing what they have always done” highlights this delusion. Institutional reform is essential to any meaningful attempt to embrace sustainability.

References

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