# Sustainability for a Small Country

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The main objective in this paper is to promote thinking on what "sustainable development" or "ecologically sustainable development" means for a small trading country. After a brief acknowledgement of some of the diverse literature on sustainability, there is a consideration of some realities facing a small trading economy. The balance of the paper comprises a discussion of the scope for a small country to enhance sustainability. This is done under several headings, corresponding to different classes of resources. Although some of the discussion in the paper is couched in general terms, much of it is in the context of Australian conditions.

## Sustainable Development

There are two literatures to which economists wanting to learn about "sustainable development" can turn. One is a rigorous theoretical literature which includes papers by Solow, Hartwick and Maler among others. The other is the less rigorous and more popular writing on ecologically sustainable development (ESD). The Report of a United Nations Commission chaired by Gro Brundtland, *Our Common Future*, published in 1987, is a key document in the second literature, as are writings by Pearce and colleagues (1989, 1990). A substantial three-chapter review of the two literatures is provided by Clarke in Clarke *et al* . (1990). Clarke, who was especially interested in the relationship between immigration and sustainability, points out that much of the rigorous work is characterised by assumptions which are far-removed from real world conditions. These assumptions include: constant population; no technological change; and a closed economy.

The Brundtland Report defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs" (p.43).

The authors of the Brundtland Report consider that some natural resources are being over exploited. In their view, renewable natural resources such as fisheries and forests should not be exploited beyond the level of their maximum sustainable yield, with account being taken of effects throughout the resources' entire ecosystems. For non-renewable resources such as oil and phosphate, use inevitably reduces the stock of resources. For these resources, "the rate of depletion should take into account the criticality of that resource, the availability of technologies for minimising depletion, and the likelihood of substitutes becoming available. Sustainable development requires that the rate of depletion of non-renewable resources should foreclose as few options as possible" (p.46). The land resource, say the authors of the Brundtland Report, "should not be degraded beyond reasonable recovery" (p.46).

No criticism of the members of the nine Working Groups, established in August 1990 to report on ecologically sustainable development in different sectors of the Australian economy, is meant in saying that their work falls in Clarke's "less rigorous" category. Prime Minister Hawke did not want a mathematical optimisation model! Moreover, he asked for a lot in requesting that their work "be guided by four fundamental goals to which the Government was firmly committed:

- the improvement of individual and community well-being and welfare that does not impair the welfare of future generations;

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- the provision of equity within and between generations;
- recognition of the global dimension; and
- the protection of biological diversity and the maintenance of ecological processes and systems" (ESD Working Group on Agriculture, pp.221-2).

The preface of the draft report of the ESD Working Group on Energy Production (1991) opened with the paragraph:

> "A principal objective of ecologically sustainable development (ESD) is to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. Precisely what this means is complex and may never be amenable to precise definition, except in very specific contexts. Nevertheless it remains a vital criterion against which policies towards the energy production sector, as well as other sectors of the economy, have to be judged" (p.xxv).

Interestingly, this prominent acknowledgement that ESD is an objective of unclear meaning was dropped from the final report!

The ESD Working Group on Agriculture (1991) was chaired by Roy Green from CSIRO. Another Green Paper on Agriculture (Harris *et al* 1974), prepared for the Whitlam Government, also addressed the maintenance of the resource base of agriculture. Although the word "sustainability" did not feature prominently in that report, and the greenhouse threat appears not to be mentioned, the two papers agree on most important issues. In particular, they both emphasise that: the self-interest of landowners is served by looking after the long-term productive capacity of their land; market incentives are often preferable to regulations for achieving environmental objectives; and research is vital for advancing understanding of how to manage agricultural systems consistently with ecological sustainability.

The Rural Green Paper (Harris *et al* 1974) pointed out that Australia is a signatory to a United Nations Declaration which has as a principle that "the capacity of the earth to produce vital renewable resources must be maintained and wherever practicable, restored or improved." It added that "detailed research is needed to make this an operational concept" (p.244).

## Realities Facing a Small Country

Usually in economics, the term "small country" means one that has no influence on world prices. In policy discussions it is the inability to influence prices of the goods and services that a small country exports or imports that is usually the focus of attention. But the production and consumption decisions taken in a small country also have no effect on prices of the factors of production – labour, capital and land – in the rest of the world.

It is not only *prices* in the rest of the world that are beyond a small country's influence. A small country has zero or near-zero influence on international technology because its allocation of resources to research and development is small. A small country might therefore be a technology taker as well as a price taker.

Because its production and resource use is very small in global terms, the contribution of a small country to any enhanced greenhouse effect is also zero or effectively zero. This is likely to be true of the small country's capacity to influence global warming indirectly by causing other countries to change their emissions of greenhouse gases, as it is of its ability to influence warming through its own emissions. Hence, it is reasonable to regard a small country as a climate taker as well as a price and technology taker.

A small country also has little if any influence on the international economic and political order. It probably has to regard the world trading regime as a given. It is excluded from many powerful international groupings.

Mathematically speaking, the "small country" concept is one that applies "in the limit". If demand curves slope downwards and/or supply curves slope upwards, then even the tiniest Pacific island nation has some influence on world prices of items in which it trades. But the effect is minuscule, as it is for the bulk of items traded by the rather larger small country Australia, and can be taken as zero for all practical purposes. Similarly, the concepts

of technology taker, climate taker and international order taker are best viewed as close approximations for most practical purposes rather than a precise universal situation. It is clear that countries of minor economic power sometimes exert substantial influence on international decisions. Australia's influence in gaining international support for the recent decision against mining in Antarctica appears to be an example. And, to take another Australian example, there is a prospect that the Sarich motor car engine will change the course of automobile technology world-wide.

On the assumption that it is not adopting a Burmese-style isolationist policy, a small country will be interacting through trade and international political relations with a rest-of-the-world sector which dwarfs it in economic and political clout. Applying the "in the limit" version of the small country assumptions, the small country has no influence on resource use, income levels or environmental pressures in the rest of the world. That is, the "sustainability" of economic and social activities in the parts of the world accounting for almost all of world population and economic activity is beyond the influence of any small country. Moving to the more realistic specification which allows a small country to have a very small influence on world prices, technology, climate and international rules, does not much change the conclusion: it is extremely unlikely that the small country can have a significant influence on the sustainability of economic activities for the bulk of humanity which live outside its own borders.

The *reverse* relationship is of a different order of importance. Developments in the rest of the world exert a substantial impact on both income levels and environmental pressures in the small country. The small country's use of resources in agriculture, for example, is guided by the world prices it faces for agricultural commodities, and these prices are determined in the rest of the world. And the technologies used in the country's production systems and embodied in its goods and services, are largely determined in the rest of the world. These technologies influence the environmental demands arising from the small country's production and consumption.

A reality arising from general equilibrium considerations may also be mentioned. This reality could be important for Australia, though its significance is not confined to small countries. The point is made in the following long quotation.

> "Policies that make agricultural, mining, manufacturing and other tradeable industries incorporate a larger share of environmental damage in their budgeting will increase the costs of these industries, and reduce their outputs. Where natural resources are at present being underpriced, or even priced at zero, by those using them in damaging ways, reduced output of tradeable goods is consistent with more efficient use of resources. More efficient use of resources implies, in this case, that the balance of payments on current account is weakened. A weakening in the balance of payments can be expected to induce a market response in the form of a lower external value for the Australian dollar. This effect will work in the opposite direction to the cost-increasing environmental protection policies, just as a currency devaluation accompanying a widespread reduction in protection has effects on industry profitability and output that are the opposite of the direct effects resulting from reducing protection. The analogy can be taken a stage further. For wide-ranging environmental protection measures that penalised tradeable industries according to the environmental damage they cause, those industries penalised heavily because they damage heavily would lose more from the environmental policies than they gained from the devaluation. They parallel the highly protected industries that lose more from removal of their protection than they gain from the devaluation that goes with the widespread removal of protection. The industries that experience only small cost increases from policies that place appropriate prices on the environment may gain more from the currency adjustment induced by the general implementation of environmental protection than they lose from having to meet the small environmental costs that they generate themselves. These industries parallel the lightly protected industries that may on balance gain from the general removal of protection. What this means is that any policy, such as implementation of 'polluter pays' or reduction of protection, that in itself reduces profitability by varying amounts across much or all of the tradeable goods and services sector, will give rise to an exchange-rate change which reduces the net impact of the policy for all industries. For some industries the net effect will be to make production more profitable than in the absence of the cost-increasing environmental protection measures" (Edwards 1990b, p.105).

A seeming reality of a rather different nature should also be mentioned. Although the economic and environmental performance of a small country will depend greatly on how fully it utilises advances made in the rest of the world, it is likely to have to rely on its own scientific research to understand the nature, limits and potential of its natural environment if this is unique. In a geographically large small economy, such as Australia, where many different ecosystems are important, sound decision-making requires a large environmental knowledge base; the country needs to make a big research effort to provide this. In the specific context of Australian agriculture, the Working Group on Agriculture (1991) said: "agricultural systems are complicated and not well understood and we need to find out more about them so that they can be managed in accordance with ecologically sustainable development principles" (p.xviii).

It may be observed that in the past Australia's advances in knowledge have had a significant effect on methods of production in its agricultural sector — notwithstanding the small contribution of Australia to the technology used in the rest of the world and its own heavy reliance on technology originating elsewhere.

## Scope for a Small Country to Enhance Sustainability

Because a small country has at best little prospect of influencing the sustainability of production and consumption configurations in the rest of the world, the discussion here focuses on the capacity of the small country to influence sustainability within its own borders. This is done under several headings corresponding to different categories of resources.

### Land and water resources

Land and water in Australia are normally regarded as non-traded resources. However, they derive their value largely from their productivity in producing traded agricultural commodities.

The use made of agricultural land in Australia depends largely on world prices for agricultural commodities. This, in turn, depends heavily on supply and demand conditions outside Australia. Cropping is generally held to put more pressure on agricultural land than pastoral activities (Chartres 1987). Thus, a sustained rise in the international price of wheat relative to the price of beef and wool might be expected to add to pressures on the land resource. However, a lasting increase in the price of wheat also strengthens the incentive faced by wheatgrowers to invest in maintaining and improving the soil resource.

Much attention has been given to land degradation in Australia (see for example, Chisholm and Dumsday 1987). It is widely regarded as Australia's most serious environmental problem. However, it appears that technological progress has easily outweighed the losses from land degradation. Making use of a widely cited estimate of the costs of land degradation emanating from DPIE (1989), Chisholm (1990) writes: "In other words, productivity growth over the last thirty years currently adds agricultural products worth over 10 billion dollars a year (1988-89 prices) to the Australian economy, while land degradation costs the economy $600 million a year in lost production" (p.113).

It is clearly desirable to reduce land degradation if the costs of doing so are less than the benefits. If the value of soil capital is known to be declining because of particular uses or management practices, it will normally be in the interests of landowners to change the uses or practices. This will be so regardless of whether an ESD ethic is abroad. Where landowners damage their land out of ignorance, there is a possible role for governments in extending information to them and in conducting research. It is disconcerting however to be told by the ESD Working Group on Agriculture (1991) that: "in many instances management practices which resulted in damage or degradation were undertaken in good faith, with the sanction, if not the insistence, of government and supported by expert advice" (p.xviii).

If landowners generate external diseconomies which damage land or other assets of others, there is again a possible benefit from government action to reduce the externality. However, Eckersley (1989) has presented an argument which implies that private land degradation costs are large relative to

external costs. The emerging view, he says, is "that for every dollar dryland salinity costs us, water and wind erosion costs $5, soil acidification $25, soil structural decline $125, and soil nutrient degradation $625". Questions have been raised concerning the validity of these estimates (Edwards 1990a). If they are accepted, however, Eckersley's big ticket items – soil structural decline and nutrient loss – are likely to involve costs borne almost entirely by the individual landowner concerned. The scope for governments to internalise externalities relating to land degradation might therefore be small in relation to the overall dimension of land degradation.

Governments of small countries – like those of large ones – have often introduced policies which cause damage to land. In Australian agriculture, longstanding tax concessions for the clearing of agricultural land are an example. Subsidies on phosphatic and nitrogenous fertilisers, encouraging excessive use of these inputs, are further examples. Mainstream economists pointed out that these policies generated net losses to society – though they transferred income to their recipients – even before the adverse environmental effects were brought into the cost/benefit calculus. The removal of the tax concessions and fertiliser subsidies by the Hawke Government represented instances of what in the greenhouse abatement context has been called "no regret" actions. The ending of the subsidies on fertilisers and land clearing differs from no regret actions by Australia to reduce emissions of greenhouse gases, however, in offering an excellent prospect of achieving environmental benefits!

Approximately 70 per cent of water used in Australia is for irrigation. Cheap-water policies are acknowledged to be another instance of governments causing economic losses and environmental damage (Kennedy and Chisholm 1990). Problems of rising water tables and salinisation are made worse by the provision of water to irrigators at less than its marginal social cost.

Producers in a small country who face perfectly elastic demand and sell at world prices on the domestic market cannot recoup in higher prices any extra costs which they incur with a move to more ecologically sound farming systems. However, these farmers will benefit from a rise in the world price if a sizable part of the rest of the world adopts a more conservationist agriculture, and in consequence experiences an upward shift in its supply curve. There is thus a potential gain to farmers in free trading countries from persuading other countries to insist on a more environment-conscious approach to farming. Of course, a small country, by definition, is unlikely to be able to do this. Perhaps there is a role for the Cairns Group here!

Environmental pressures in Australian agriculture are generally considered to be less than in other important agricultural producing countries where more intensive farming systems are used. A consequence is that costs in Australian agriculture could rise less than in the rest of the world with an international move to reduce agriculture-related environmental damage. The net result of such a move, when world markets adjusted, could be a net gain for Australian farmers, even though their own costs were increased.

Similar reasoning to that used above points to Australian farmers obtaining all the benefits from research which lowers the costs they face in maintaining their natural resource base at a given quality level, and to their losing from research which allows farmers in the rest of the world to save on these costs.

**Tradeable exhaustible resources**

Do considerations of ecological sustainability provide a case for a small country to conserve its reserves of tradeable resources such as oil, coal or iron ore? The answer appears clearly to be "no". While the resource continues to be used in the rest of the world it will be possible for the small country to obtain supplies through trade. If the resource ceases to be used in the rest of the world, because substitutes become available, reserves held by the small country would be of little value. In the event that substitutes were not developed, and the rest of the world were seriously damaged by the exhaustion of the resource, it is a moot point whether a small country possessing substantial stocks of the resource would be able to retain them for its own use.

A small country could increase the total physical

stock of a resource - oil say - remaining in its territory at some future date by reducing its consumption of the resource now, or by restricting its exports. Either of these courses would reduce present real incomes, and it seems at least as likely that future citizens of the country would lose from the action as gain. The small country's action would not affect the future world price of the resource, which is the key to its future real cost. The real world price could rise or fall in future depending on many types of developments in or impacting on the world energy market. These developments, which would occur in the rest of the world, could arise in many ways, including discoveries of new oil or alternative energy resources and technological developments reducing the price of oil.

A conservationist policy in the small country would weaken incentives to search for the resource in that country. Hence, although the policy would add to actual stocks of oil in the country in future periods it could reduce the size of *known* oil reserves and *economic* reserves.

It is important not to misunderstand the argument advanced above. Making user prices of resources reflect the full social costs, including environmental costs, of their use would appear to be necessary for "ecologically sustainable development", as well as for efficiency as defined by mainstream economics. The point being argued is that reducing the depletion of tradeable exhaustible resources below the level occurring when price is equated to marginal social cost can be expected to reduce the welfare of present and future generations of citizens in a small country.

**Tradeable renewable resources**

Mainstream economics recognises the need to restrict the exploitation of resources such as fisheries and native forests. This is a requirement to ensure that the marginal social costs of exploitation do not exceed the marginal social benefits. There is more than one rate of harvest of a renewable resource that is consistent with a sustainable yield. The choice between a lower harvest/lower regeneration rate and a higher harvest/higher regeneration rate will be influenced by the price of the resource. For a tradeable resource produced by a small country, this price will be determined in the rest of the world. Mainstream economists also emphasise that in determining the most efficient rate of harvesting a renewable resource, attention must be given to the effect on other activities dependent upon the resource, such as recreation.

At least some supporters of ecologically sustainable development appear to support the setting of harvest rates for native forests and for fisheries independently of costs and prices at a level judged to be "sustainable". This approach means forgoing the opportunity that exists with renewable resources to vary the harvest in the shortrun with the economic return. The idea of not taking advantage of substantial ability to vary harvests quickly in response to profitability would probably strike woolgrowers and wheatgrowers, who have little flexibility of this type in the short-run, as irresponsible! Surely in the information age a country can do better for its present citizens and their descendants than to deny prices a role in deciding on rates of production?

**Unique flora and fauna**

It is widely accepted that a country, large or small, has a special responsibility to protect plant and animal species which are unique to it. One reason for preserving species is that advances in knowledge may show that they possess ingredients which are very valuable for medical or other products. This can be regarded as an option value. Another reason lies in intrinsic, or existence, values. The option and existence values to Australians of preserving the country's unique species are often likely to be smaller than, and perhaps dwarfed by, the values which the rest of the world derives from their preservation. Each country will therefore have insufficient incentive to invest as much in enhancing the prospects of species surviving as would be optimal from a world perspective. This particular market failure is not confined to small countries, though the discrepancy between the preservation effort that is optimal from a national and a global view is greater for a small country. The problem of under-investment in species preservation under national decision-making seems likely to be especially great in the case of low income small countries having many unique species. Brazil comes to

mind as an example. The resource misallocation which can arise when a country makes decisions without regard to the impacts on option and existence values in the rest of the world is analogous to those that can occur when Tasmania disregards the value of wild rivers to mainlanders in taking decisions on hydro power projects.

**Population increase**

Do "small countries" necessarily have small populations? The answer seems to be "no". A country with a large population and a low per capita income could exercise a smaller impact on world markets, technology and climate than a country with a small population and a high level of incomes.

One consequence of being a small open economy is that the connection between population increase and the level of production of tradeable commodities need not be a close one. Indeed, in the case of traded agricultural commodities, standard partial equilibrium analysis indicates that small country producers will experience no change in price and hence no incentive to alter the level of production or production methods as population changes. Given that the great bulk of Australian agricultural production is considered to be carried out under conditions approximating small country, free market conditions, this result raises questions about the argument that a larger population means an increase in agriculture-related pressures on the environment. If population increase does not affect the level or methods of production, there will be no consequences for physical impacts on the environment arising from production of tradeable agricultural commodities. Of course, population increase could impact on agricultural production via general equilibrium effects on factor prices and the exchange rate. However, little is known about the nature of these effects (Edwards 1990b).

A small open economy will experience immigration and emigration. If the country affords protection to its export industries by charging domestic consumers a price above export parity and paying producers an equalised price for sales on the domestic and export markets, the equalised price will increase with an increase in population due to immigration (or natural increase). Under this form of agricultural protection, which exists in the Australian dairy industry, an increase in population adds to the resource misallocation costs arising from the market intervention. Another way of looking at this is that protection in the form used in the dairy industry reduces Australia's economic benefits from immigration. This interaction between population increase and the deadweight costs of protectionism is caused by the change in the relationship between producer price and export price as domestic sales increase; it does not arise with other forms of protection such as conventional production or export subsidies (Edwards 1990b).

As Australia's population increases, the costs of adverse externalities generated in agriculture will rise. This is because certain of these external costs have "public bad" characteristics. The size of the external costs arising from algal blooms in a lake or stream, for example, increases with the number of people viewing it. This points to a lower level of agriculture-related external damage being optimal as population increases.

## Conclusion

The sustainability of any country's resource use will be influenced strongly by developments in world prices, technology, climate and the international economic order. For a "small country" — such as Australia — developments in these areas are determined predominantly beyond its borders. A small country can insulate itself from world prices and technologies — though not from the climate served up by nature and the rest of the world — but it is likely to make its current and future citizens worse off if it does so. Wills' argument in this volume that sustainability may be better assessed by looking at the openness of the information and signalling systems than at trends in resource use seems particularly relevant to small countries.

A small country *can* enhance the sustainability of its economic-environmental systems by improving the understanding of its natural resource systems and by internalising externalities. In particular, there is scope for a small country to influence the sustainability of its own systems through research into those features of its natural environmental and

those natural resource-based production systems which are not found in other countries. In Australia, much research into the relationships between farming systems and the land and water resources with which they interact falls in this category.

## References


CHARTRES, C. (1987), "Australia's Land Resources at Risk", in Chisholm, A. and Dumsday, R. (eds), *Land Degradation: Problems and Policies*, Cambridge University Press, Cambridge.

CHISHOLM, A. (1990), "Population Growth, Agriculture and Land Degradation", in Clarke, H. *et al.*, *Immigration, Population Growth and the Environment*, Report to the Bureau of Immigration Research, AGPS, Canberra.

CHISHOLM, A. and DUMSDAY, R. (eds) (1987), *Land Degradation: Problems and Policies*, Cambridge University Press, Cambridge.

CLARKE, H., CHISHOLM, A., EDWARDS, G. and KENNEDY, J. (1990), *Immigration, Population Growth and the Environment*, Report to the Bureau of Immigration Research, AGPS, Canberra.

ECOLOGICALLY SUSTAINABLE DEVELOPMENT WORKING GROUP (1991), *Energy Production* (Draft Report), AGPS, Canberra.

ECOLOGICALLY SUSTAINABLE DEVELOPMENT WORKING GROUP (1991), *Agriculture* (Final Report), AGPS, Canberra.

DEPARTMENT OF PRIMARY INDUSTRIES AND ENERGY (1989), *Third National Conservation Report*, AGPS, Canberra.

ECKERSLEY, R. (1989), *Regreening Australia: The Environmental, Economic and Social Benefits of Reafforestation*, Occasional Paper No.3, CSIRO, Canberra.

EDWARDS, G. (1990a), "Regreening Australia: What Rationale and What Price?", *Agricultural Science* March, 40-43.

EDWARDS, G. (1990b), "Trade, Population and the Environment", in Clarke, H. *et al.*, *Immigration, Population Growth and the Environment*, Report to the Bureau of Immigration Research, AGPS, Canberra.

HARRIS, S., CRAWFORD, J., GRUEN, F. and HONAN, N. (1974), *The Principles of Rural Policy: A Discussion Paper*, AGPS, Canberra.

KENNEDY, J. and CHISHOLM, A. (1990), "Impact of Immigration on Renewable Resources", in Clarke, H. *et al.*, *Immigration, Population Growth and the Environment*, Report to the Bureau of Immigration Research, AGPS, Canberra.

PEARCE, D., MARKANDYA, A. and BARBIER, E. (1989), *Blueprint for a Green Economy*, Earthscan, London.

PEARCE, D., BARBIER, E. and MARKANDYA, A. (1990), *Sustainable Development: Economics and Environment in the Third World*, Edward Elgar, Aldershot.

WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (1987), *Our Common Future*, Oxford University Press, New York.