Future directions

The ASEC identified six key issues fundamental to the sustainability of Australia's environment. These are closely linked to the long-term sustainability of the nation's economic and social interests. These issues are:

- the protection of natural and cultural heritage
- barriers to implementing environmental sustainability
- adaptive management
- research and monitoring
- data and information management
- widespread adoption of sustainability in Australian society.

This Report points firmly to the need to integrate environmental, economic and social policy in the future. The current debate over the Kyoto Protocol, for example, highlights how policy makers are considering appropriate limits on greenhouse emissions together with resultant effects on economic and social systems.

Protecting our heritage

Heritage—our sense of place and our links to the past—helps define our identity and our values as a society. Sites with heritage values often attract tourism to both remote and highly settled parts of the continent. Crucial to their sustainability are the interpretation and presentation of their heritage values while regulating their use to avoid damage to their heritage values and effects on surrounding communities.

The increasing pace of urbanisation and development, along with the economic decline of some areas in rural and regional Australia, has often damaged our cultural heritage even before it is recognised or documented. However, the pace of change in itself is making people more aware of the potential for loss, and of the need to guard against it. It is vital that there be an increased emphasis at all levels on undertaking comprehensive heritage surveys. Regulation is important to ensure that heritage considerations are integrated into decision-making at an early stage, rather than as an afterthought. The state of heritage needs to be monitored regularly and reported on frequently and becomes a normal part of the business of Commonwealth, state, territory and local governments.

Of concern to the ASEC in preparing SoE (2001) was the relative imbalance in attention given to protecting natural over cultural heritage. This imbalance presents a barrier to our management and appreciation of heritage in an integrated way. It also diminishes the human contribution to our continent and ignores the layers of history and human use that create cultural landscapes. The balance needs to be restored otherwise maintenance of our cultural heritage will wane (relative to protection given to natural heritage) to the detriment of future generations.

The trend within the heritage profession in the 1990s of recognising cultural landscapes is not reflected in community understanding or government administration, which largely continues to separate Indigenous, historic and natural environments. The approach of listing individual places versus the recognition of those places in their broader landscape context, natural or cultural, rural or urban, is yet to be widely recognised as a preferable approach. More up-to-date ways to identify and protect the multiple heritage values in cultural landscapes need to be adopted by all jurisdictions in the future.

Understanding the connections between language, land, and the movement of Indigenous peoples remains a major challenge. This is especially required in remote areas as we strive to integrate the values of Indigenous peoples with their commercial land management responsibilities and the interests of non-Indigenous landholders with broader national goals. Such integration will be improved by ensuring more Indigenous heritage managers are trained for senior positions in state and Commonwealth agencies. To raise consciousness of Indigenous heritage—Australia's most extensive category of heritage—more opportunities to build protocols to protect Indigenous heritage and to exchange knowledge in an open and equal way between groups in society (*garma*) are needed.

Any move that might inhibit the process of identifying, documenting and managing Australia's distinctive natural and cultural heritage is of great concern. In particular, the proposed closure of the Register of the National Estate would be a retrograde move. At the

time of writing (mid-2001), there is uncertainty over future heritage management. The ASEC considers an overarching challenge is to agree upon a national strategy for the identification and management of Australia's heritage.

Barriers to implementing sustainability

Public good and private benefit

Landowners and land managers, together with those who influence their behaviour such as the financial institutions, will need to manage land for both the public benefit as well as the private good. There is by no means agreement within the Australian community that land management should take into account conservation and management actions on a landscape, or even on a catchment, scale. The New South Wales Farmers' Association, for example, has been voicing concern that 'steadily increasing Government expectations about the environmental outcomes required of owners of private land are eroding property rights and amount to theft by statute' (NSW Farmers' Association 2001).

The ASEC argues that equity considerations need to become part of any regional environmental management plan. This includes providing sufficient resources to balance the cost to individuals of including public good elements in any actions to improve the environment.

The Commonwealth *Native Title Act 1993* does enrich the opportunity for Indigenous peoples to protect their heritage while not impairing the rights of non-Indigenous parties with interests in land. The effect of native title on land and water management processes varies and continues to evolve through the development of Indigenous land use agreements and the impacts of judicial decisions.

The issue of land tenure and property rights will receive increasing attention by industry, individual landowners, land managers and possibly the judiciary in order to ensure that broadly agreed environmental results can be obtained from the expenditure of funds from private and public resources within the constraints of the legal system.

Financial tools for sustainability

The ASEC asserts that public action towards conservation and resource management will not, by itself, provide the necessary stimulus to achieve sustainability. Financial incentives, including the roles of taxation and rate relief need to be investigated. More extensive tax incentives such as those in the USA and UK may be required to encourage private conservation in Australia. Changes to capital gains tax and income tax law announced by the Prime Minister in August and October 2001 are aimed at benefiting landholders who set aside part or all of their land for conservation in perpetuity.

If private–public partnerships to foster sustainability are to occur on local, regional or national scales, then initiatives such as conservation trusts, compensation for restrictive covenants, promotion of land retirement with occupation rights to owners, or similar mechanisms (PriceWaterhouseCoopers 2001), will need to be considered carefully.

The importance of the role of the finance sector will increase as the environmental performance of companies becomes a factor in their ratings. Although there are signs this is happening, the extent to which shareholder sentiment, environmental law and disclosure requirements combine to produce improved environmental outcomes is still uncertain. In Europe and North America, the requirements of the finance sector in relation to environmental and social issues are more onerous than in Australia.

Many major companies see advantages for shareholders in taking positive steps towards environmental best practice and there are opportunities for investment in areas as diverse as solar energy, water management, heritage education, and use of genetic typing to protect and enhance biodiversity.

The links between environmental performance and credit, investment and reputation risks for companies are becoming more apparent. Assessing the environmental and financial performance of agricultural and pastoral properties in a similar manner will be difficult. Both financial and environmental risk should be considered where properties are undercapitalised or at risk, so that the full implications for the environment in which they are located are acknowledged in any financial or environmental management arrangements.

Regulatory tools

Land and water use is a pressing and critical problem for Australia. Regulation, supported by compliance mechanisms, will be needed to improve environmental quality in some areas for land and water use. As yet the commitments of the states and other authorities to regulating the water flows in the Murray–Darling river system, doing away with unsustainable irrigation practices, improving estuary water quality, and reducing land clearing, is far from satisfactory. A major coordinated effort between stakeholders will be necessary to solve these problems.

Regulatory tools have been effective in improving urban air quality over past years, as noted in the *Atmosphere* theme report. Commonwealth standards for emissions from motor vehicles, for example, have reduced the amount of sulfur dioxide and nitrous oxides able to be emitted into the atmosphere. Comparable regulation will almost certainly be required in water and land use management.

Adaptive management

Environmental management in Australia is fragmented vertically between levels of government and laterally at each level of government. It suffers further from an inability to integrate across a range of scales (i.e. from species or paddock to landscape or catchment systems; or from building to suburb to city to region). A problem is that institutions of government have failed to keep up with this need to integrate management systems, and regional problems confronting Australia reflect these institutional impediments.

Australia's inability to manage adaptively has affected long-term viability of economic, social and environmental systems. Many factors influence the pattern and intensity of these problems. Where problems are significant they may lead to enraged communities who, without obvious institutional solutions, will adopt simple solutions to situations that involve complex interconnected natural and human processes.

The tools for improving management systems need refining over the next few years if Australians are to learn to live sustainably. The Commonwealth has acquired some tools needed to change the institutional frameworks within which environmental management is conducted. At the Commonwealth level, the focus for national integrated policy and planning should be based on natural systems as well as offering incentives (e.g. tax) for modifying private sector behaviour. The state bureaucracies should be delivery and evaluation driven with much closer links to local government and communities for outcomes. Such a strategy is able to contribute to the rebuilding of economic activity in regional areas while recognising the need to protect and enhance environmental and heritage values at local, regional and national scales.

The drive towards sustainability from the perspective of a single nation responsible for the integrated, adaptive management of a megadiverse continent points to a clearer definition and acceptance of responsibilities and powers. The delivery of ecosystem services such as biodiversity, clean water, carbon sequestration, quality leisure, and the restoration of degraded landscapes and heritage places should come from a range of joint Commonwealth–State policies managed by a mix of state agencies with the assistance of local government, community groups and the private sector. Quality control should remain the preserve of the state agencies. In some specialised areas of production, industry regulatory organisations could be responsible for quality control.

The basis for such an approach is for management systems to be *adaptive*. A starting point is to recognise that environmental management is effectively an unreplicated experiment. Change is possible only if the system is understood. Such understanding provides a basis for monitoring the performance of the system and adjusting the system as management options are applied within the framework. In an adaptive system, scholarship has the dual role of discovering and defining desired reality, measuring actual reality, generating options and applying measurements that allow management to be adjusted. Management practices need to be adapted and developed progressively in accordance with the results of this 'experimental' evaluation, and this information made available to as wide an audience as possible.

Such an approach is likely to be of particular value where scientific understanding is limited (e.g. fire, tree planting, restoring hydrological balance, habitat management, and intensive visitor effects). State agencies assisted by Commonwealth incentives should facilitate adaptive management by local governments and the landholders and community groups on individual properties and reserves across regions in order to improve understanding of

effective conservation management at a landscape scale. This is also true for heritage properties where adaptive use aims to retain cultural heritage significance while allowing a new use for the resource.

In many ways adaptive management is common sense. However, the failure of Australians to understand the scale and complexity of the forces underlying environmental change that confronts them means that we need to learn again to live with the peculiarities of our continent, 'our country'. There have been numerous successful attempts to reach such a situation, the old Kidman Beef production model being one. But both SoE (1996) and SoE (2001) have documented those struggles which will persist unless a concerted effort is made to reorganise institutional arrangements for environmental management that emphasise integration, collective learning, incentives to change behaviour and adapt to long-term, not just short-term, pressures.

Research and monitoring

There is a pressing need to continue with research into the state of the environment, into methods of maintaining or improving the environment, and to evaluate the programs and policies designed to improve the condition of the environment. Organisations such as CSIRO, CRCs, state government agencies, universities and industry groups should all continue to make essential contributions. One example is the contribution made by the mining industry in the definition of background ecological and environmental conditions in the regions in which they operate. These efforts should be continued and be further encouraged. Studies commissioned by the states, the Commonwealth and private and public enterprises draw on the considerable expertise in environmental consulting available in Australia, and such activities should continue.

The knowledge contained in organisations and the skills of individuals will be of key importance to research and monitoring activities. Environmental professionals in industries such as the mining industry already exist. Agencies from state environmental agencies through to local councils employ environmental officers, and the research agencies of all kinds depend on new graduates with specialist knowledge of different aspects of the environment being available. Our education and employment systems need to ensure that the supply of such people continues.

Data and information management

Reliable data and information are key issues for SoE reporting in Australia. The theme reports provide extensive detail on problems with the availability of environmental data, its quality and the usefulness of the SoE indicators. Common problems across the themes include:

- important gaps in primary data
- lack of access to some data because of institutional barriers
- confusion about intellectual property and copyright
- lack of trend data for some variables
- some data cannot be aggregated and compared on a continental scale because of diversity of scales and geographical divisions that work against aggregation.

These limit Australia's capacity to measure environmental progress and by implication, they also limit its capacity to develop sound environmental policies, to make wise investments in environmental programs, to measure progress and to make wise statutory decisions.

The 1990s have seen a significant increase in the available data and information base on the environment. New information technology creates opportunities for drawing information together from a variety of systems and remote sensing, but can also result in a flood of data and information with little increased knowledge or understanding. It will be important to prioritise continuing investment in the collection of site data and the capacity to assess and integrate information.

The unique nature of the Australian environment presents particular challenges—a large terrestrial and marine environment, a highly endemic biota, and a small human population to draw expertise from. In the face of this challenge, Australian science has developed an advanced capacity to add value to data and information by using advanced modelling techniques. These approaches have been crucial to enabling the use of sparse data for decision-

making outcomes such as RFAs, national reserve planning and screening development proposals for potential effects on the environment.

Key challenges are the targeting of investment and the development of cooperative frameworks for information collection, access and use. Data are managed across a range of jurisdictions, and there are several institutional impediments which hamper access and use for integrated national views. An optimum approach is to seek agreed data standards and protocols from the data custodians, and to apply technology which allows for easy access to distributed databases. The fundamental principles are to maximise the return for decision makers, ensuring access, fitness for use, and integrity of the original data.

Areas requiring urgent further action include the development of:

- investment models for national data/information infrastructure
- definition of data that should remain in the public domain as opposed to data that should be commercialised
- common frameworks for the collection and sharing of data.

In response to changing budget priorities, some public agencies have been expected to generate revenues from data sales or from selling value-added products. By restricting the free flow of data in this way, use and reuse of data by both public and private sectors is reduced. Privatisation of once-public data holdings is also a concern. Some of these impediments are being resolved through the Commonwealth's Spatial Information Industry Action Agenda, and through the establishment of new spatial data management initiatives including the merger of AGSO-Geoscience and AUSLIG, Australia's national mapping agency, and a new Commonwealth Spatial Data and Access Pricing policy. These initiatives should assist in ensuring spatial data is made publicly available.

Substantive progress has already been made on national standards for data collection, access and use. ANZLIC (Australia New Zealand Land Information Council) is developing a Australian Spatial Data Infrastructure (ASDI) to provide better access to essential spatial data. A key element of the ASDI is the Australian Spatial Data Directory (ASDD), an online directory which allows users to search for spatial data sets from across various government and private sector custodians. Based on a nationally agreed metadata standard, this directory now contains information about some 40 000 data sets from 19 contributing organisations, including the private sector.

Through the National Land and Water Resources Audit, the Commonwealth government will have invested about $44 million over five years to provide a comprehensive national appraisal of Australia's natural resource base. This is significant step towards addressing important gaps in land, water and vegetation data. Although not yet finalised, the Audit was useful in the preparation of SoE (2001). It has succeeded in generating national baseline information. Fundamental to its success has been an ability to foster trust and collaboration between institutions (within and between jurisdictions), encourage agreement to national data standards and generate priorities for collecting primary data. In doing so, it has generated practical solutions where data collectors and data custodians are scattered across numerous institutions in all jurisdictions. A very useful trend has been to make its data freely available over the Internet (see http://www.nlwra.gov.au/ANRA/atlas_home.cfm).

Significant advances have been made in a range of available data required for environmental decision making, particularly under the EPBC Act. These include the implementation of a Collaborative Database on Protected Areas, a Directory of Important Wetlands and a nationally significant threatened and migratory species database. The Australian Biological Resources Study has continued to document Australian flora and fauna, and the Australian Virtual Herbarium is a promising new distributed species database.

The National Pollutant Inventory, also used in the preparation of SoE (2001), is a specific example of an ongoing commitment across jurisdictions to provide accessible and standardised data on emissions across Australia and should, in the ASEC's opinion, be supported and continued with the broadest possible remit.

It is expected that significant new data on land and water will be compiled under natural resource management policies and programs, notably the Extension to the NHT and the new NAP for Salinity and Water Quality. Access to such data must be integrated and freely available.

For SoE reporting purposes, agreement has been reached across Commonwealth and state jurisdictions on a set of core indicators (ANZECC 2000). Refinement of SoE indicators in the light of SoE (2001) is a priority for the Commonwealth, states and territories. The

development of terrestrial and marine biogeographical regions has provided a useful reporting framework for both SoE and the NLWRA, and complementary work on data standards is also needed.

A particularly important lack are data for assessing trends. Effective environmental investment needs to be informed by a sound understanding of cause and effect. Often, this requires decades of trend data. Nor can the scientific skills to collect the data, and to develop methodologies and models to use the data effectively, be turned on and off. A significant difficulty is that the horizon for governments is often much shorter than the environmental processes they are managing. A useful strategy might be to develop bipartisan support for a long-term national approach to environmental data. This may be best achieved by working with the major programs addressing Australia's environmental issues, perhaps through the new NRM Ministerial Council.

Towards sustainability

Australia is far from achieving sustainability, and major problems and impediments remain.

In many situations, such as changing our land use practices or reversing the over-allocation of river waters to irrigation, the challenges are immense. The recent publicity surrounding the extent of damage caused by rising water tables and land clearing must signal a start to a process, not an end.

Public attitudes and awareness is vitally important in our system of government where public opinion can drive regulatory and community actions. Australians need to know much more about how our environment works, and how and why it is changing. We need to use information technology to provide information to as many people as possible.

Australia is not alone in confronting the problems of sustainability. As in other countries, solving these problems involves many components, including:

- research
- the application of appropriate skills and knowledge
- information access
- community participation
- capital works
- long-term commitment of resources
- integrated decision-making across jurisdictions
- incentives to change attitudes of landowners and managers
- the use of regulation and market forces where appropriate.

The NAP for Salinity and Water Quality is an example of integrated, long-term investment in the protection and sustainability of catchment resources affected by salinisation. The NAP seeks to empower regional communities to use targeted and coordinated action to overcome the causes of dryland salinity. It can be seen as a model for regional national resource management and environmental management in Australia that involves:

- a central role for regional communities in both planning and implementation of plans
- a national/state accreditation process for the plans
- a sharing of costs between states and Commonwealth governments with a commitment expected as well from adequately resourced local governments
- an acceptance of the need for continued research and monitoring of outcomes to provide accountability and support for the adaptive learning process
- a willingness by landholders (and their financiers), supported by incentives, to care for others as well their own interests
- a recognition that issues need to be given priorities at a local or regional level, and that technical and financial resources must be directed to these priorities as a matter of urgency
- an understanding that many problems will be with us for decades and only patient, sustained investment and commitment by governments, industry, communities and landholders (and their financiers) will yield satisfactory outcomes.

The Commonwealth government is clearly in a key position to provide the necessary leadership to guide the nation further along the arduous path towards sustainability, but the states and territories, supported by local communities, are equally important. Steps taken with the new EPBC Act, the NAP for Salinity and Water Quality, and funding for the Extension to

the NHT in the 2001–02 Budget are all positive. Agreements between the Commonwealth, states and territories through COAG on water reform, biodiversity, heritage place protection and air pollution are considerable achievements.

The key to Australia's sustainable future lies in ourselves: our attitudes towards the environment, our heritage and each other. Positive change can be achieved when people see options for improvement in their quality of life and opportunities for their children and grandchildren. This change is accelerated when public awareness is translated into political action that influences the activities of our society to care for our country.