

'Ecological emergencies' and resource and environmental management

The purpose of this and the other articles is to discuss what constitutes an 'ecological emergency', and to consider some of the key linkages between environmental/ecological management and emergency management in Australia. To do this, the article provides some ecological and environmental management context as background to the discussion. We argue that both fields have much to offer each other in terms of insight to improve the quality of planning and management. Moreover, emergency management agencies have a vital role to play in regard to the management of ecological emergencies in Australia. The connections between the two fields need to be identified and developed to maximise opportunities for improved management.

Environmental change, and many emergencies and hazards, have at least some of their roots in basic features of the Australian environment, such as droughts, flooding rains and wildfires. Climatic variability, especially in precipitation, is one enormously important and well-recognised feature. Of ecological importance are generally nutrient poor soils, and long periods of evolutionary isolation (van Oosterzee 1995). These and other factors have resulted in a rather unique suite of ecosystems and species, with patterns of frequency and abundance of plants and animals, and linkages to the non-living environment, that are peculiarly Australian. Australia is the only rich country considered 'mega-diverse' in biological diversity (biodiversity), and a rare case where one political jurisdiction covers and entire continent (Common and Norton 1992, Dovers and Williams, in press). Yet rates of loss and degradation of species and ecosystems have been high since European settlement, due to habitat alteration (esp. land clearance and land use change), predation and competitive interference by introduced weeds and pests, and competition with and displacement by domestic stock (SEAC 1996). Some native species have increased due to human-induced changes, but the bulk

by Stephen Dovers, Centre for Resource and Environmental Studies, The Australian National University; and Tony Norton, Department of Land Information, RMIT University

have diminished—especially those of limited or specialised distribution or those located in parts of the landscape also attractive to human use. Of significant concern is the impact of humans on important ecological processes—the foundations of natural systems. These ecological processes include nutrient cycles, climate processes, hydrological cycles and pollination. This concern shifts attention from traditional 'nature conservation' and single threatened species concerns, to a more fundamental level of system health.

Resource and environmental policy and management in Australia

Australia's modern history of environmental management began soon after European occupation, with regulations dealing with water quality and timber harvesting prior to 1800.¹ Through the 19th century, policy and management activity dealing with issues such as water and forests, and a little with urban environmental quality, was evident. More elaborate systems of policy, management and regulation were not put in place until this century. Frawley (1994) characterises the trend as from 'exploitative pioneering', through 'wise use' of natural resources for national development, to 'environmentalism'. Currently, all three are still recognisable. In the past few decades, we have moved from a concentration on fairly simple nature conservation and end-of-pipe pollution control, to an attempt at much more integrated approaches. This began in earnest with the 1983 National Conservation Strategy, but was more fully discussed and developed during the 1990s under the title 'Ecologically Sustainable Development' or ESD. More recent approaches have some core features, including:

- the linking of ecological, social and

economic dimensions of problems, and the (proposed) treatment of these in an integrated fashion (i.e. environmental issues cannot be treated as a discrete, separate policy and management area). Especially important has been the close linking of environment and development;

- recognition of the need to address deeper causes and wider contexts (e.g. reducing waste streams and/or resource use rather than just cleaning up afterwards; protecting biological diversity across entire landscapes, not just in reserves; or managing land and water issues across whole catchments in an integrated way);
- recognition of global dimensions and linkages with many issues, such as biodiversity or climate change;
- increased importance attached to non-market values of environmental resources, such as aesthetic and cultural, but especially of 'ecosystem services' like clean water, genetic diversity, nutrient cycles, soil protection or climate amelioration;
- the search for new policy and management approaches to supplement traditional regulatory and educational approaches.

Some basic principles of ESD, including the need for environmental-social-economic integration, the precautionary principle and community participation, have not only been avowed in policy, but have been expressed or referred to as statutory objects and guiding principles in some seventy Australian laws.² In recent years in Australia, there has been a major period of development of national (including the Commonwealth,

Notes:

1. Before this, of course, indigenous Australians managed the environment, especially through the use of fire, and indigenous knowledge and tradition is being increasingly recognised and drawn upon in resource and environmental management.

2. The precautionary principle is relevant here, stating that lack of scientific certainty should not be used as an excuse to postpone environmental protection measures, suggesting more proactive or preventative approaches.

states/territories and sometimes local government) policies and approaches, generally formulated with the involvement of stakeholders, including:

- National Strategy for Ecologically Sustainable Development;
- National Strategy for the Conservation of Australia's Biological Diversity;
- National Forest Policy Statement;
- National Greenhouse Response Strategy;
- National Rangelands Strategy;
- National Waste Minimisation Strategy;
- Oceans Policy;
- National Decade of Landcare plan; and
- Commonwealth Wetlands Policy.

These are supported by literally hundreds of subsidiary policy programs, such as the many funded through the Natural Heritage Trust, and the states and territories have a complex raft of policies and laws as well. Australian policies match major international policies and conventions, including Agenda 21, the Convention on Biological Diversity, the Framework Convention on Climate Change and the Convention on Desertification. In terms of substantive environmental issues that are topical at present, the following comprise the great bulk of the current policy agenda:

- greenhouse and climate change (international coordination of responses, impacts, and policy options especially concerning energy use and land clearance);
- conservation of biodiversity, both on and off-reserves, with emphasis on land clearing, the impact of introduced species, degradation of inland streams, and the possible implications of climate change;
- land degradation, including soil erosion, acidification and salinisation;
- resource conflicts in forests, between extractive, conservation and other values;
- water allocation conflicts, between extractive, environmental and other uses;
- use and management of the marine realm and the coastal zone;
- improving industrial 'metabolism', through more efficient production processes and waste management and minimisation;
- urban environmental protection, especially regarding city air quality.

Some major policy trends have been evident in recent years in the resource and environmental field. These have influenced policy and management styles and the sorts of policy instruments used across all these issues, and include:

- 'marketisation', being both the reduction

of state involvement through measures such as outsourcing and corporatisation, and the application of market-based policy instruments (often more in theory than practice—Eckersley 1995; Dovers & Gullett 1999);

- a move away from regulation, towards volunteerism, self-regulation, codes of practice and agreements;
- a large move towards community participation and involvement, by rural, urban, remote and indigenous communities, in environmental management and monitoring (the more inclusive mode of national policy development of the 1980s-early 90s, however, has diminished in the past few years). This community dimension is most well known through Landcare, but there are many other programs;
- increasing use of risk assessment and management approaches (but certainly little agreement as to their usefulness), and more attention to policy and decision making in the face of uncertainty;
- a strong regional focus in planning, policy implementation and program delivery;
- much greater use of sophisticated computer-based models and decision support systems to underpin policy and management;
- an emerging interest in the longer term institutional and informational underpinnings of 'adaptive, learning' policy processes and management regimes (but little evidence of their creation so far) (Dovers and Mobbs 1997).

In the final part of this paper, it is suggested that these trends closely match recent developments in emergency management.

Defining ecological emergencies

The term 'environmental emergencies' (and environmental risk) is generally taken to refer primarily to pollution episodes (e.g. chemical or oil spills, fires at factories) and mostly to situations where *humans* or their property are the primary concerns. Most discussion of 'ecological emergencies' relates to international environmental law and policy, referring to situations where countries have some responsibility to inform each other of major spills or incidents. For the purposes of this article we propose that:

'ecological emergencies' are sudden-onset events where the subject is non-human, such as biological diversity, an ecosystem, a species, or a river system. In an ecological emergency,

humans or human property may also be threatened, but the threat may be only to non-human entities.

This is not to underplay the importance of threats to humans, but to shift the focus so as to better consider what sharp events mean for natural systems, and whether and how we should be concerned about that. The definition may be centred on the system threatened, or the source or kind of threat. Oil spills in ecologically valuable areas remote from human populations are a well established example, as are water pollution events (e.g. fish kills from chemical accidents, or from exposed acid sulphate soils). Remnant vegetation and habitats (in urban or rural areas) are open to threats, such as fire or pollution episodes. Rare species are another vulnerable part of the environment, and are susceptible to, for example, an outbreak of disease or of introduced plants or animals. Inland streams and coastal estuaries are particularly vulnerable also.

A key point is that ecological emergencies are sharp manifestations resulting from underlying processes and phenomena. One part of the underlying condition will always be the variable nature of the Australian environment, and this is important to recognise, but more important from a management and policy perspective will be the additional impacts on natural systems, above the background variability, resulting from human actions and institutions.

Connections

There appears to be a number of levels of connection between environmental and emergency management, and thus bases for closer engagement between the two fields of policy and practice. We propose three categories (the following is explored further in Dovers 1998a, 1998b)

Substantive interactions

The most obvious connection between the two fields of policy and practice is 'at the coalface', or rather at the fire front, the chemical spill, the flood, etc.

Bushfire is probably the most well known case (and one not without conflict between environmental and emergency managers, both operationally and with respect to policy goals). Pollution episodes (spills, releases) are another, where threats to both humans and the environment coincide, and where both professions will meet, set immediate priorities and make decisions.

Other 'parts' of the environment such as inland waterways, remnant vegetation areas and estuaries are subject to sharp onset events—floods, cyclones, wind

storms, nutrient pollution and associated algal blooms—but the emergency-ecological linkages are probably less recognised. One question is: can the two sets of imperatives—human needs and natural system needs—be reconciled better *well before* emergencies or sharp onset events occur?

Common causes and problem types

At a deeper level ecological change, whether slow or rapid, and emergencies have similar causes. Generally they both arise from interactions between environmental variability, human behaviour and human institutions. Policy problems in sustainability such as biodiversity, climate change and land degradation exhibit features that make them different in both kind and degree from many other areas of public policy and administration. Some of these features are:

- broadened, deepened and highly variable scales of space and time;
- quite often irreversible and typically cumulative impacts;
- complexity and connectivity between problems;
- pervasive risk and uncertainty;
- problematic moral dimensions (rights of other species, future generations);
- causes embedded deeply in patterns of production and consumption, governance and human settlement;
- strong demands for community involvement;
- the novelty and unfamiliarity of policy and management problems.

One field of policy and management that does share many, if not most, of these attributes is emergency management. This suggests that some degree of two-way learning from experience should be possible, which would require institutional and practical linkages.

Similar policy and management trends

Given the above, there are some obvious parallels between the two fields in terms of current trends and approaches. Salter's (1998) summary of changes in emergency management could just as easily describe

many recent changes in emphasis in resource and environmental management (table 1).

In environmental management, the increase in community-based programs, attention to causes rather than symptoms, and emphasis on whole-catchment or cross-landscape approaches are equivalent to what Salter describes. So there are types of problems shared. Also, both fields are adapting to the risk management standard AS/NZS 4360:1995 (see Salter 1998 on emergency management; and there is a Standards Australia working group compiling a handbook for applying the standard to environmental management).

Recent court cases and literature revolving around application of the 'precautionary principle' are of interest to emergency management (e.g. Dovers and Handmer 1995, Deville and Harding 1997, Gullett 1997). In both areas, the opposing notions of resilience and vulnerability are being explored, and the different interpretations of these terms within risk/hazards and ecology need to be clarified. Both environmental management and emergency management are constantly adapting to a changed environment of public policy and administration involving market-led reform, competition policy, public sector cuts, and new performance expectations (Dovers and Gullett 1999, Kouzmin and Korac-Kakabadse 1999).

The connections between the two fields are both real and potential, and both positive (i.e. opportunities for coordination and cooperation) and perhaps negative (i.e. clashes in mission, possible institutional gaps). We believe that both fields have much to offer each other in terms of insight to improve the quality of planning and management. Moreover, emergency management agencies have a vital role to play in regard to the potential future management of ecological emergencies in Australia. The connections between the two fields need to be explored and exploited to maximise opportunities for improved management. However, this will require some potential barriers

(e.g. different management styles, institutional and procedural standards, or information systems) to be addressed if connections are to be created to support improved environmental, ecological and emergency management in Australia.

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From:	To:
Hazards	Vulnerability
Reactive	Proactive
Single agencies	Partnerships
Science driven	Multi-disciplinary
Response management	Risk management
Planning for communities	Planning with communities
Communicating to communities	Communicating with communities

Table 1: changes in emphasis in resource and environmental management