Fire research and policy priorities: insights from the 2003 national fire forum

Dovers, Cary and Lindenmayer define some key issues for future bushfire research and policy

Introduction

In February 2003, The Australian National University hosted a long-planned national fire forum aimed at bringing bushfire research and policy closer together (Cary et al 2003). The meeting was intentionally cross-disciplinary, and was the first time the full range of relevant natural and social sciences had been brought together with policy makers and managers. It was perceived that for too long, discussions of fire have been contained among separate groups organised around disciplines or specific management concerns, and subsequently the potential of cross-discipline and cross-sector discussions had not been realized.

The meeting was originally planned as a small, focused meeting of researchers and agency representatives. However, in the aftermath of the devastating January 2003 fires in Canberra and nearby high country a month earlier, the event grew to a large public conference. At a time of considerable stress for many involved, the event was marked by vigorous yet civilised discussion, and by the presentation and development of useful ideas and directions for research and policy. This contrasted with the debate in the media at that time and since. As well as reflecting the personal and professional qualities of those who attended, this positive tone was enhanced by the fact that papers and discussants came from a range of professions and natural and social science disciplines, mostly concerned directly with fire but from other risk and natural resource domains as well. That diversity of inputs demonstrated clearly that no one perspective can make sense of the complex phenomenon of fire or recommend singular policy and management responses across varied landscapes.

Communication among diverse interests is important, especially given the consolidation of fire research enabled by the establishment in 2003 of the Bushfire Cooperative Research Centre. The papers presented at the forum, along with panel responses and summaries of discussions, are presented in Cary et al (2003). Drawing on insights from the forum, this article defines some key issues for future bushfire research and policy in Australia, structured within five themes: ecology and environment; fire behaviour and fire regime science; people and property; policy, institutional and legal settings; and fire and Indigenous land management.

As well as identifying particular issues, the article conveys a central message—despite valuable existing knowledge and skills, our ability to live with fire in an ecologically and socially sustainable way is severely hampered by persistent knowledge gaps. A key issue is the lack of integration of knowledge from different policy sectors, disciplines and cultures. Closer links between Indigenous and non-Indigenous cultures, natural and social sciences, and emergency management, natural resource management and other relevant policy sectors are considered critical.

Ecology and environment

In contrast with perceptions of many people and the media, particularly in south-eastern Australia, who consider fire as an occasional catastrophic event which remains briefly in the memory, fire is an integral part of most Australian ecosystems, varying in space and time. A key concept in all aspects of fire behaviour, management and policy is the fire regime (Gill 1975) – the often complex sequence of fires in an area over time – and its components – fire type, frequency, intensity and seasonality. Fire regimes are influenced by many drivers including climate and landscape factors such as vegetation type, slope and aspect. Human influences on fire regimes are driven, in part, by human value systems and the activities and land uses determined by those values. One component of those human activities are purposeful fire management activities, but as Gill and Bradstock (2003) note "…extent to which fire regimes can be controlled or imposed by people is largely unknown".

An important future direction in fire management and policy is to develop a national program to identify and map fire regimes in Australia (Gill and Bradstock 2003)—a process perhaps with some broad similarities to the National Forest Inventory orchestrated by the Australian Government in partnership with the States and Territories. Such a program would have strong and long-term implications for all aspects of fire science, including fire threat analysis, calculation of greenhouse gas emissions, understanding the response and conservation of biota, and providing data for the validation of landscape-fire vegetation models (Cary and Bradstock 2003; Krebs 2003). The current absence

Knowledge and research is still insufficient to confidently predict fire behaviour

of such a national program is consistent with the poor and patchy state of basic monitoring of many aspects of natural resource management, not only fire management and its impacts (Dovers 2001). This is a significant challenge, and one that brings fire management into line with other domains of natural resource management in the sense that a major aim must be to identify ecologically sustainable fire management regimes just as, for example, overarching goals in the forestry and water sectors have incorporated ecologically sustainable forest and water management, respectively. However, there has been a poor record of cross-sectoral learning in resource management in Australia, which begs the identification and linking of "cognate policy sectors" such as emergency management, natural resource management, public health and community and regional development where problems with similar attributes are routinely encountered (Dovers 2003).

Given the lack of such fire regime mapping and associated environmental monitoring, together with the limited knowledge of the ability of humans to control or impose fire regimes, it is important that activities associated with fire regime manipulation, such as prescribed burning for fuel reduction, be sensitively designed and applied, and thoroughly documented. For example, not all areas of target landscapes should be burned at the same frequency and intensity (Gill and Bradstock 2003). Varying fire intensities and fire intervals, and examining key aspects of ecological response, provide critical opportunities for large-scale "natural experiments" (*sensu* Walters and Holling, 1990) to investigate and become better informed about the most and least appropriate ways forward in the complex arena of fire management (Bowman 2003). This approach of "adaptive management" organised around structured experiment and learning, is alluring, but the requirements of information, organisational support and persistence should not be underestimated (Dovers and Mobbs 1997).

Although climatic conditions are key drivers of fire regimes in Australian landscapes, and future climate changes are likely to have significant impacts on fire regimes (Cary 2002), one of the major impediments to better forecasting fires is scaling of climate models (Lindesay 2003). Global climate models are necessarily "coarse" and it is difficult to downscale results to produce regional scale climate models that can inform fire management (Mackey et al., 2002). This requires urgent attention as finer scales are of greatest relevance to fire management.

Finally, a problem in dealing with the complex issues associated with fire management is the influence of the different value systems and knowledge bases of scientists, policy-makers, commercial interests, media commentators and affected communities involved in fire debates. For example, those largely concerned with fire suppression might view the structural and floristic composition of forests, woodlands and other vegetation types in terms of "fuel" for fires (Bowman 2003). That fuel is also a crucial variable in the performance of catchments to deliver sufficient quality and quantity of water. From a biodiversity conservation perspective such

fuel (eg. structural attributes such as dead trees, large logs and litter beds on the forest floor) are habitat for wildlife (Gibbons and Lindenmayer, 2002, Lindenmayer et al., 2002). From a fire suppression perspective, fence-lines and buildings are assets. These are also regarded as assets by ecologists, but plants and animals are also considered to be assets worth protecting. Throughout the broader community, perceptions and definitions of 'assets' are highly variable, including these and other aspects.

A key challenge in fire research and policy is to identify ways to resolve such differing but equally legitimate perspectives. This will help find common ground and "mature" the debate to levels that facilitate better informed policy development and decision-making. Constructive public debate is sometimes difficult to achieve in Australia and can be undermined through populist politics, vested interests of public or private organisations, and the simplistic, adversarial character of modern media (Dovers 2003). These represent serious challenges to achieving the complex trade-offs that will be part of attempts to identify ecologically sustainable fire management strategies.

Fire behaviour and fire regime science

Much fire science seeks to develop understanding of, and improved models for, fire behaviour at a range of spatial scales (Andrew and Queen 2001). Primary models link interacting variables including fuel, weather and terrain, and provide insights into fire spread, fire intensity, fire spotting and fire fighter safety. Secondary models address fire effects, evaluation of alternate management strategies and air quality. Tertiary fire models address landscape fire regimes, social issues, and fire management models, amongst other issues.

Fire regime science encompasses a broad range of research into the sensitivity of fire regimes (frequency, intensity, season and type of fire – Gill 1975) to factors including management interventions, variation in fuel, weather and ignition characteristics that arise from different geographical locations, and climate change. The ecological importance of fire regimes is discussed elsewhere (Gill and Bradstock 2003, Bowman 2003, Bradstock et al. 2002).

Fire behaviour and fire regimes science relies heavily on modeling including, in the case of fire regimes science, simulation modeling. Experts disagree on which processes represent the key to modeling fire behaviour but agree that there are still limitations on basic scientific knowledge and input data. For example, Weber (2003) highlights the importance of the dynamics of moisture in fuel particles during the passage of bushfire, a mechanism not included in current fire behaviour models. Lindenmayer (2003) argues that the conventional notion of a straightforward relationship between fuel loading and fire behaviour should be challenged. Gould (2003) argues that lack of knowledge on spatial variability of fuel quantity and structure and limited ability to predict local weather remain a constraint to fire behaviour prediction. Understanding gained through research and experience to date notwithstanding, knowledge in these areas is insufficient to confidently predict fire behaviour across a broad range of vegetation types. Resolving the relative importance of basic physical mechanisms that underpin fire behaviour and vegetation response remains a high

Photo by Dianne Thompson

Fire is an integral part of most Australian ecosystems

priority. Equally important is communication of knowledge across different areas of research, policy and management, and community stakeholders.

The role of modeling is contentious in fire behaviour and fire regime science, particularly for increasingly complex simulation models, as it is in many other areas of research. Some experts argue that models have contributed little to the understanding of ecological phenomena, and that modelers, while recognising the limitations of their models, continue to produce contingent results that nonetheless influence policy decisions (Krebs 2003). Others argue that models provide valuable and otherwise unattainable insights into phenomena like spatial patterns of fire regimes and their sensitivity to management that can only be studied empirically over very long time-frames (Cary and Bradstock 2003), or the sensitivity of fire regimes to climate change that cannot by definition be studied empirically (Cary 2002). There is agreement that these represent important research areas for which we urgently require greater insights. Modeling will provide insights into possible implications of manipulating different variables in a landscape over time (Bartlett 2003), including the efficacy of varying levels of prescribed burning at the landscape scale (Cary 2003), in the short term, and can provide hypotheses that can be tested with surveys of managed systems and long-term monitoring, but will not provide all of the answers that fire managers require.

Irrespective of whether simulation or empirical approaches are preferred, modeling and data collection in the absence of theory may be unproductive. Weber (2003) argues for a greater theoretical emphasis in researching fire behaviour. There has been considerable research into spatial variation of fire regimes and the processes that drive them, but there is no comprehensive theory to explain spatio-temporal variation in fire frequency, intensity, season and type that comprise fire regimes. Developing theory describing fire regime phenomena remains an outstanding challenge. Appropriate theory will assist in overcoming the issue of scaling which represents one of the biggest challenges facing fire behaviour/regime scientists. Scientists study fire behaviour at the laboratory and plot scale. However, the ability to scale understanding to fires with intensities beyond that feasible for experimentation, and to broader spatial scales relevant for landscapes, remains elusive. Important scaling issues include the involvement of complex fuel structures and the way they are integrated by larger scale fires, and the interaction between the convection column of a fire and the ambient wind field. Incorporating fire behaviour knowledge into landscape-level fire-regime simulators provides challenges of a similar magnitude. Long-term monitoring of wildfire behaviour (Gould 2003) and accurate mapping of all fires in a national spatial fire database (Gill and Bradstock 2003) are the only means by which models of high intensity fires and of fire regimes can be validated. This would require considerable resources.

Fire retardation qualities are not well incorporated into building and planning practices

As with the use of models in other arenas such as biodiversity conservation (eg. Lindenmayer et al., 2003), it is not a case of whether modeling or empirical studies are the best, but rather that both are necessary. Empirical data are needed to parameterise models, and models are needed for prediction and hypothesis generation to inform empirical research. The key is that researchers engaged in both modeling and empirical research recognise the value of working together and be more aware of the strengths and limitations of their respective fields.

A final challenge is the incorporation of findings into policy. This requires that research be relevant, timely and generally applicable across a range of specific management locations (Gould 2003). Policy and management imperatives might prompt the release of findings before they are adequately tested or properly peer-reviewed. Increasingly, the commercialisation of Australian research can limit the wider communication of research findings (eg. commercial-in-confidence). There is also the danger of the findings of location-specific research being unwisely extrapolated to other landscapes via “one-size-fits-all” policy and management prescriptions. There is arguably a case for more clearly labeling research findings according to their empirical basis, state of completeness, validation and publication

Policy planning and management needs to translate to on-the-ground activities

in non-refereed and peer-reviewed literature (Funtowicz and Ravetz 1990). This would enable policy-makers, managers and researchers alike to ascertain the level of confidence that they can place on research findings.

People and property

Clearly, our understanding of fire and the efficacy of different management responses to threats to people and property posed by fire could be improved, but there are also inadequacies in terms of co-ordination and integration of knowledge and experiences across domains. Also, usable knowledge may exist but not be incorporated in policy and management. For example, Leonard (2003) points out the uncertainties associated with different house designs and materials in terms of fire retardation qualities. Nevertheless, what is already known about designs and materials is insufficiently incorporated into personal behaviours, building practices and regulations, and planning codes. Relevant standards do not reflect available technical knowledge, arguably because of the influence of vested interests, which indicates not only an area for more vigorous policy development, but also for better connection between research and policy. The issue of the adequacy of implementation and the related one of evaluation of policy and management interventions to identify implementation patterns recur across many aspects of fire policy.

The failure to monitor, evaluate and learn from policy experiments may result from inadequate resources in agencies, reluctance to engage in evaluations, lack of appropriate skills or poor communication. Policy learning and the application of lessons must involve increased sophistication of understanding and recognition of different implementation contexts rather than simple mimicry (May 1992).

These questions arise in the context of technical and scientific knowledge, but also in the less well-attended area of social science research. Rohrmann (2003) identifies the important roles that socio-psychological perspective can play in understanding people's complex perceptions of and responses to risk. However, it is apparent that such knowledge is, on the one hand, imperfect and requiring better development and, on the other, poorly appreciated by other disciplines and professions. As both communication and community-based management responses are widely accepted as important, socio-psychological research and its application are crucial. To think otherwise is akin to claiming that fire science and fire ecology are irrelevant to understanding fire behaviour and the role of fire in the landscape.

The incorporation of socio-psychological research into fire policy and management emphasises the importance of developing processes and incentives for improving integrative and interdisciplinary research and its connection with policy and management. This applies to the integration of different natural science perspectives on fire (eg. fire behaviour, fire ecology, climatology), the integration between social science domains (eg. policy evaluation, psychology, law), and most difficult of all, across the natural-social science divide. There is a role for the humanities as well, such as for ethicists to inform

discussions over the balance between controlling nature or controlling human behaviour, or environmental historians in contributing knowledge of past fire events and responses to them (on the latter, see Dovers 2000). Centuries of specialisation in disciplines, research organisations and professions, and across government portfolios, weigh against such integration: however, fire research is not alone in requiring such a shift which is also a priority in, for example, resource and environmental management.

There is agreement that community-based policy and management options can be effective and will be increasingly relied upon (Rohrmann 2003, Bradstock 2003, Wilson 2003). However, communities are complex and the unthinking transfer of a model of community involvement from one context to another is unlikely to be advisable—just as transfer of fire suppression practices from one vegetation type to another is. It is only recently that knowledge of the nature of communities and the dynamics of information and informal social institutions within them has been valued, and this is a priority area for research. Another priority is rigorous, sustained evaluation of community-based programs to provide a more solid basis for future program development and implementation. Such research should be soundly informed by accumulated knowledge in areas such as program evaluation, deliberative methods, risk communication and risk psychology, rather than undertaken by managers or researchers not skilled in these areas. Only recently have organisational arrangements to encourage incorporation of social science research into the wider body of fire research and policy emerged—the for example the Risk and Community Safety Research Initiative established by Emergency Management Australia and The Australian National and RMIT Universities in 2001 and within the Bushfire Cooperative Research Centre (2003).

In terms of evaluation, particularly of community-based programs, the range of experiences and knowledge can be expanded by considering areas other than fire (Rohrmann 2003, Wilson 2003). This includes other areas within risk and emergency management, but also from areas such as crime prevention and natural resource management (Dovers 1998). To do this, connection between these research and policy domains will have to be built, with an awareness that policy learning in complex policy domains such as fire will be dependent on recognition of policy interventions as mixes of interdependent policy instruments operating within dynamic institutional systems (Connor and Dovers 2004).

To connect different research perspectives and to enable constructive policy debates, common bases for discussion are needed. Proper evaluation of different management interventions is one such basis, if the results are widely available. Another basis is conceptual models of fire risk such as the D=I.S.E.G.H.[1] model presented by Bradstock (2003). Such models can provide clarity in debates over what the key variables are, even if we cannot yet (or ever) be precise in a quantitative sense about the relative contribution of a particular variable. Indeed, by allowing identification and discussion of such uncertainties, such models allow more constructive research planning and even policy development, by enforcing a degree of rigor and consistency between participants in what are often discordant debates.

A clear message from Bradstock's (2003) model, and indeed from much other work, is that multiple strategies are required to manage human-fire interactions, and moreover that the optimal mix of strategies will change across time and place. However, optimal co-ordination between different aspects of fire policy is rare. Improving capacities to identify, implement, evaluate and continually improve those strategies should be a high priority, presenting challenges for managers and policy makers, but also for researchers if they wish to inform policy and management. The challenge does not only confront those concerned with fire, but other areas of risk and hazard, and in resource and environmental management where it is increasingly accepted that variable mixes of policy instruments (eg. regulatory, educative, market-based, etc) are required far more often than singular responses.

Policy, institutional and legal arrangements

Policy, institutional and legal arrangements for fire research and management policy should reflect the nature of the issues faced. Yet consideration of the nature of fire in the landscape and the multiple interacting dimensions of responses to fire suggests that we a far from this ideal. Studies of fire behaviour and the dynamics of fire in Australian landscapes and ecosystems highlight complexity and uncertainty, and multiple variables that are of differing importance across space and time (Bradstock et al 2002). As Tarrant (2003) states, fire represents a complex policy problem. That is because fire is a complex biophysical phenomenon: connectivity characterises fire and should characterise our policy, institutional and legal settings (Wasson 2003). Handmer (2003) emphasises the complexity – and ambiguities and uncertainties – inherent in the institutional landscape, as well as

1 D (adverse risk to people and property) = I (ignition in the landscape) x S (fire reaching the urban interface) x E (encroachment into built environment) x G (fire propagation within the built environment) x H (fire propagation within buildings).

the unfortunate segregation of policy functions in the face of highly connected biophysical and human variables. That emphasises important areas of applied research and policy development. One is R&D and policy to enable optimal (or at least not dysfunctional) organisational structures to connect various aspects of fire management, that are effective and efficient and discourage unwise reliance on or ignorance of other elements or strategies. Whole-of-government arrangements and responses represent a major challenge, typified by tensions between the roles and mandates of large land managers (eg. forest or parks services, farmers), policy agencies, and fire and other emergency services, before, during and after fire events.

Handmer (2003) and Tarrant (2003) identify the fragmentation of research as well as of policy, but also recent trends in emergency management that may allow some improvement. These trends, such as from individual to shared decision-making, and from reliance on protection by agencies to community coping, are recent and demand ongoing research and policy developments. These trends also expose important issues between collective and individual responses and responsibilities, and Cheney (2003) among others highlights the dangers of a more litigious future. Henri (2003) highlights the key role insurance and under-insurance plays as an individual response but also in financing collective responses. The recurrence of confused debates over the role of insurance (or lack of it) after major fire events suggests that better communication of the role of insurance is required (a similar situation occurs in the case of floods, Smith et al 2002).

There is also the question of whether increasing reliance on community preparedness has been coincident with deskilling and diminishing of government services following Australian public sector reforms in recent times. Reliance on community-based programs begs close attention to the design and support of those programs, and to the interaction between various volunteer programs and between these and agencies and other programs (such as research, planning, house design changes, etc). In regional areas with proud histories of volunteerism (fire brigades, SES, etc), ever greater reliance is being placed on volunteerism not only with respect to fire, but to many other policy areas as well, such as community health, environmental and land management, crime prevention, etc (this issue is discussed by Handmer et al 2004). The limits of volunteerism need to be considered across policy sectors (for reviews of similar issues in the natural resources sector, see Curtis 2003; Dore et al 2003). More specifically, the co-ordination and integration of different risk management activities at community level, or at least the avoidance of confusion and tension between them, is emerging as an important research and policy concern.

Indigenous land management

Discussions around the themes of environment and fire behaviour stress the impossibility of fire-proofing Australia, and this is emphasised again with respect to Indigenous land management. Some contend that by using Indigenous fire management as a guide, the impacts of fires may be reduced – although wildfires will not be prevented. Indeed, from an evolutionary perspective, Bowman (2003) argued that through the long biogeographical history of fire in Australia, one of the great triumphs of the Pleistocene Australians was the taming of wildfires through the development of "igniculture". Clearly there are some lessons here for modern Australian society in learning to live with, rather than only fight against fire (Bowman 2003; Baker 2003; Liddle 2003).

The development of igniculture by early Indigenous Australians would not have been without impacts on vegetation or associated wildlife over early millennia. It is likely that these fire regimes would have had negative effects on species dependent on long-unburned fire refugia (like leaf-eating kangaroos) and probably contributed to their extinction. Notably, the cessation of Indigenous fire regimes following white occupation also may have disadvantaged a range of species – and as hypothesized by Bowman (2003), the "tamed fire regimes" developed by indigenous people then became "feral" after European settlement. Re-taming fire will be a major challenge to land managers given the extent of infrastructure that now characterises many landscapes – including at the ever-expanding bushland-urban interface where fire management poses particular logistical, human health and other problems. Indeed, fire (and attempts to control or prevent high-intensity conflagrations) is attracting increasing public interest and conflict between interests because there is an ongoing expansion of settlements adjacent to fire-prone native vegetation (Whelan 2002).

Despite these challenges, it is clear that major insights into fire management can be gained from examining approaches developed over many millennia by Indigenous Australians. This is a key area of research and policy development (Whelan 2003). These approaches will vary between vegetation types, landscapes and regions and there will not be a single strategy that can be applied in all places. Indigenous fire management is not a 'recipe book' but rather an ethos of understanding, respecting, and living with the environment (Baker 2003; Bowman 2003; Hill 2003; Whelan 2003).

The capacity for knowledge exchange about fire management between Indigenous and white Australians, while important in both theory and practice (Burrows 2003), is limited. First, it is critical to recognise that scientific and Indigenous knowledge systems have much in common (Baker 2003), overlap considerably,

and should not be seen as mutually exclusive (Whelan 2003). This is an important point as traditional knowledge has often been trivialised by western science even though the former has the ultimate "peer-review" process (Indigenous people's lives depend on getting fire management right—Baker 2003). Second, it is clear that from an indigenous perspective, there are great sensitivities associated with both ensuring that indigenous knowledge is passed on by the "right people to other right people", and how knowledge is stored and who has access to it. These are issues that must be dealt with cultural sensitivity and approaches to cross-cultural communication (such as the "bridging tools" proposed by Hill 2003) remain as a major future area for research.

Despite the problems inherent in cross-cultural communication, maintaining indigenous knowledge of fire management is nevertheless essential not only for the maintenance of aboriginal culture and social cohesion (Davis 2003), but for the ongoing management of indigenous lands, and to allow white Australians to learn from this (Burrows 2003). Indigenous communities need to be provided with the tools and supporting mechanisms to not only maintain and protect such knowledge but also to implement it on the ground as part of managing their country and demonstrating the value of such approaches in practical ways (Hill 2003).

Conclusion

Fire is a fundamental component of Australian landscapes and always will be. It is not possible to fire-proof Australia, although it may be possible to reduce the impacts of some (although probably not all) fires. Given the pervasive nature of fire in this continent, it is clear that attention paid to it in terms of research and associated funding has in the past been inadequate. There are too few fire scientists, fire policy specialists, experts in cross-cultural fire knowledge, and others with expertise in fire, such as those with interests in:

(1) relationships between fire and the Australian biota;
(2) how and why fire regimes vary across space and time;
(3) legal and institutional frameworks that relate to fire management; and
(4) fire risk assessment and emergency management response.

The national fire forum from which this paper developed (Cary et al 2003) made it clear that linking and integrating insights from different disciplines and professions is an added and important challenge. It is time for the nation to address these important deficiencies, rather than continue the tradition of letting fire slip from the public and research memory within a few years of each major fire event. The crucial task of identifying ecologically sustainable fire management policies and practices that are consistent with community safety and other social values cannot be appropriately tackled until significantly increased levels of research, policy, management and public interest are maintained in the long-term. In the view of an international observer (Krebs 2003), a significant increase in resources available to these areas is a key to facilitating this.

Fire is a fundamental component of Australian landscapes—rural and urban

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Australian Emergency Manuals

In response to client feedback, the structure of the Australian Emergency Manual series has been revised. The series no longer comprises five parts. The skills set manuals (formerly parts 4 and 5) are available from State and Territory training managers and are listed separately. The manuals are filed in alphabetical order for ease of location. Enquiries about the series should be directed to ema@ema.gov.au.

AUSTRALIAN EMERGENCY MANUALS SERIES STRUCTURE AND CONTENT

Manual 2	Australian Emergency Management Arrangements
Manual 3	Australian Emergency Management Glossary
Manual 4	Australian Emergency Management Terms Thesaurus
Manual 18	Community and Personal Support Services
Manual 29	Community Development in Recovery from Disaster
Manual 15	Community Emergency Planning
Manual 27	Disaster Loss Assessment Guidelines
Manual 9	Disaster Medicine
Manual 28	Economic and Financial Aspects of Disaster Recovery
Manual 8	Emergency Catering
Manual 1	Emergency Management Concepts and Principles
Manual 23	Emergency Management Planning for Floods Affected by Dams
Manual 5	Emergency Risk Management – *Applications Guide*
Manual 11	Evacuation Planning
Manual 20	Flood Preparedness
Manual 22	Flood Response
Manual 21	Flood Warning
Manual 25	Guidelines for Psychological Services: Emergency Managers Guide
Manual 26	Guidelines for Psychological Services: Mental Health Practitioners Guide
Manual 13	Health Aspects of Chemical, Biological and Radiological Hazards
Manual 6	Implementing Emergency Risk Management – *A facilitators guide to working with committees and communities*
Manual 19	Managing the Floodplain
Manual 17	Multi-Agency Incident Management
Manual 7	Planning Safer Communities – Land use Planning for Natural Hazards
Manual 14	Post Disaster Survey and Assessment
Manual 10	Recovery
Manual 24	Reducing the Community Impact of Landslides
Manual 12	Safe and Healthy Mass Gatherings
Manual 16	Urban Search and Rescue – Capability Guidelines for Structural Collapse

EMERGENCY SERVICES SKILLS SERIES

Manual 38	Communications
Manual 39	Flood Rescue Boat Operation
Manual 37	Four-Wheel-Drive Vehicle Operation
Manual 35	General Rescue
Manual 33	Land Search Operations
Manual 42	Managing Exercises
Manual 36	Map Reading and Navigation
Manual 31	Operations Centre Management
Manual 34	Road Accident Rescue
Manual 41	Small Group Training Management
Manual 30	Storm Damage Operations
Manual 40	Vertical Rescue