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NATIONAL FRAMEWORK FOR ENVIRONMENTAL AND HEALTH IMPACT ASSESSMENT

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National Health and Medical Research Council

NHMRC

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Contents

Acknowledgments vi
The purpose, scope and limitations of this report vii
Summary and user's guide x
Part I: Context and principles of E&HIA x
Part II: Steps in conducting E&HIA xxii
Part III: Evolving methodological issues in E&HIA xxxiii

1 Incorporating health into environmental impact assessment: background and philosophy 1

1.1 The need for HIA 1
1.1.1 Development of this report 2
1.1.2 Applying the proposed E&HIA protocol 3
1.2 International context 3
1.3 Philosophy underlying the proposed E&HIA framework 6
1.4 Conclusion 11

2 Resourcing Environmental and Health Impact Assessment 13

2.1 Introduction 13
2.2 Direct costs 14
2.3 Resource options for auditing and monitoring 14
2.4 Indirect costs 15
2.4.1 Redeployment of existing resources 15
2.4.2 Education and training 16
2.4.3 Development of the knowledge and methodology base 16
2.5 Conclusion 17

3 Australian experience: the existing administrative and legislative context for E&HIA 19

3.1 Introduction 19
3.2 Administrative context of E&HIA in Australia 21
3.2.1 Existing administrative structure 21
3.2.2 Health Impact Assessment within the existing EIA process 24
3.3 Legislative context 24
3.3.1 Current legislative procedures for EIA in Australia 24
3.3.2 Australian legislative practice and responsibilities in relation to health in EIA 25

RESCINDED

3.4 Towards a more integrated approach 34
3.4.1 Models of environmental management integrating local and legislative contexts 37
3.5 Conclusion 38

4 A framework for Environmental and Health Impact Assessment 41

4.1 Introduction 41
4.2 Preliminary analysis 43
Step 1: Screening 43
Step 2: Scoping 46
Step 3: Profiling 52
4.3 Risk analysis 56
Step 4: Risk assessment 60
Step 5: Risk management 65
4.4 Implementation 69
Step 6: Decision-making and implementation 69
Step 7: Monitoring, auditing and evaluation 72
4.5 Conclusion 79

5 Evolving methodological issues in E&HIA 81

5.1 Introduction 81
5.2 Strategies and processes for community consultation 81
5.2.1 Risk communication 85
5.2.2 Community involvement in monitoring of health impact 87
5.3 Identifying indicators of public health and well-being 88
5.4 Standard setting 90
5.5 Economic considerations in decision-making 95
5.6 Conclusion 97

Appendixes 99

1 Report of the consultancy process 99
2 Issues in Environmental Health Impact Assessment Australian case studies 102
3 Inter-Governmental Agreement on the Environment Schedule 3 109
4 A National Approach to Environmental Impact Assessment in Australia (ANZECC) 111
5 Guidelines for identification of environmental significance 126

Glossary 133

References 137

EXCLUDED

List of boxes

Box 4.1	Steps in the E&HIA process	42
Box 4.2	Projects that should be screened by health authorities	45
Box 4.3	Tasks in scoping	46
Box 4.4	Checklist of issues which may be relevant in E&HIA	48
Box 4.5	Baseline information which contributes to profiling	54
Box 4.6	Minimum dataset for industrial development proposals	55
Box 4.7	Qualitative factors to be assessed in a rapid appraisal for urban development	56
Box 4.8	Risk analysis	58
Box 4.9	Dealing with uncertainty	65
Box 4.10	Obstacles to public participation in risk management	67
Box 4.11	Mitigation measures	68
Box 4.12	Objectives of environmental auditing	74
Box 4.13	Problems in environmental auditing	76
Box 4.14	Objectives pertaining to health impact audit	79
Box 5.1	Guidelines for effective consultation	82
Box 5.2	Risk communication	87
Box 5.3	Involving communities in planning and monitoring chemical storage facilities	88
Box 5.4	Considerations and controversies in setting environmental exposure standards	92
Box 5.5	Setting exposure standards	93
Box 5.6	Local conditions which may require modification of standards	93

RESCINDED

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C. Ewan
A. Young
E. Bryant
D. Calvert

University of Wollongong
June 1993

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The purpose, scope and limitations of this report

The framework which forms the substance of this report was commissioned by the Department of Human Services and Health's National Better Health Program and developed by the Department of Public Health and Nutrition and the Department of Geography at the University of Wollongong

There is a national recognition of the need to coordinate the efforts of the Commonwealth, States and Territories in their approach to environmental protection, and the need to address health social and cultural impacts specifically in Environmental Impact Assessment (EIA) has been acknowledged by the Inter governmental Agreement on the Environment (IGAE, February 1992). The principal brief of this project was thus to develop a national framework for incorporating health impact assessment into the process of environmental impact assessment (E&HIA).

This final report is the product of a phased program of consultation conducted over a period of two years (see Appendix 1 for details). Its main purpose is to identify a logical sequence of steps for E&HIA which are compatible with environmental impact assessment practice, and which address the issues, principles and problems underlying the implementation of environmental and health impact assessment (E&HIA).

A considerable majority of comments received on the public consultation draft supported the framework generally as outlined. It was evident, however, that for some respondents the report's purpose and implications had not been delineated sufficiently clearly. Two quotations illustrate the widely variant expectations of the framework. From an industry spokesperson:

> **We do not agree with the radical agenda for restructuring society underlying the report's approach to the inclusion of health in EIA. Elements of this are expressed, for example, as 'EHIA is a social and political process as much as a technical one'.**

And from a consumer advocate:

> **A more useful and workable framework would be one centred around social and political aspects of the decision-making process, rather than a process based on risk assessment techniques.**

These statements encapsulate core philosophical differences which characterise the debate surrounding environmental issues and environmental impact assessment. Respondents representing both perspectives emphasised the need for legislative

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changes or safeguards, unambiguous guidelines for implementation, and guarantees to protect or redress imbalances in the resource base of various constituencies. Those subscribing to the second view, however, criticised the proposed framework as 'based on a fundamentally flawed process' (the EIA process) and pointed to the unequal power bases from which various actors in the process operate, while those who subscribe to the first view saw the framework as an invitation to unwieldy, unpredictable, unscientific and unaffordable processes with no proven benefits.

A third significant body of opinion wanted the framework to encompass a broader sweep of environmental health issues. Issues such as management of contaminated sites, incorporation of health into strategic regional planning, cumulative regional impacts, ongoing environmental monitoring, and licensing and control procedures are all integral parts of the problem that E&HIA seeks to address. They lie, however, beyond the scope of a protocol intended for integration with existing statutory EIA procedures and can only be mentioned in passing in the context of the present report. Several respondents drew attention to the dangers of expecting E&HIA to solve all environmental health problems when only a small proportion of developments are subject to the process.

The framework proposed in this report can provide only a starting point for the negotiations which must occur to reconcile the divergent views outlined above. E&HIA is part of a political and social process which involves all levels of government, industry and public service sectors, experts and lay people. This report cannot, and was not intended to provide a final solution to the many issues which arise in the implementation of E&HIA. Resolution of most of those issues will depend on formal inter governmental agreement, State legslation and evolving local practice.

The report does, however, provide a systematic review of the issues, options and procedures which form the basis of an approach to integrating health impact assessment into environmental impact assessment. It is not intended to be an inflexible prescription for practice, but a guide for policy-makers, to indicate the ground they must cover in the next phase of the process. Specific issues which will need to be addressed in the implementation of a credible and efficient E&HIA process are identified in the report, and include:

- Negotiation between health, environment and planning sectors to identify the most important and feasible elements of E&HIA as priorities for action, in the context of the IGAE.
- Determination of the agency which should be responsible for:
  - providing a single point of contact for proponents of developments;
  - screening projects to assess the need for E&HIA;
  - ensuring health input to scoping and assessing teams;
  - coordinating and interpreting health-related data.

- Identification of a structure for decision-making which assures tie community that the assessing body is 'independent' and therefore credible. Much of tie dissatisfaction surrounding EIA is based less on tie community's perception of the technical aspects of the risk than on their lack of trust m the decision-makers.
- Formulation of legislative or regulatory guarantees which assure proponents that goals and standards are explicit, practicable and achievable, that procedures are known, quantifiable and cost-efficient, and that the costs of tie process as well as the benefits are shared by those responsible for ensuring the health and wellbeing of the population.

C. Ewan
August 1993

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Summary and user's guide

Part I

Context and principles of E&HIA

Application of the proposed framework for E&HIA

The report which forms the main part of this document reviews the background to Environmental Impact Assessment and Health Impact Assessment (EIA and HIA) in Australia, the political and administrative contexts in which they operate, and the technical and methodological issues which need to be addressed. It suggests a protocol for environmental and health impact assessment (E&HIA) which can be incorporated within existing EIA processes, and provides criteria, methods and guidelines for ensuring that proponents, decision-makersand affected communities have appropriate information, support and safeguards for their roles in the process.

This summary and user's guide highlights the main issues and features of the process of environmental and health impact assessment (E&HIA), and provides a checklist of considerations and general principles which could be applied in the course of E&HIA.

It should be emphasised at the outset that while the proposed framework and commentary are comprehensive, the protocol is intended to be applied selectively. It is neither feasible nor desirable for all E&HIA to follow an inflexible standardised protocol for assessment of health impacts. Rather, a wide range of indicators, options and methods is provided to emphasise that flexibility is required in the criteria by which different proposals are assessed, and that informed judgements should be made about those issues which are most relevant in each case. The protocol incorporates suggestions for early decision points at which those judgements are made by proponents, relevant agencies and affected communities.

Tne principles embodied in the protocol can also be adapted for less formal assessments of environmental impact of developments which are not captured by formal EIA procedures. Where applicable, the principles should be further developed and adapted by public health authorities to address both cumulative impacts, and regional and temporal monitoring of environmental health. Throughout the development of this report there has been consistent local government support for a more systematic incorporation of health concerns in EIA at local and regional planning levels.

It must also be emphasised that E&HIA is inextricably linked with public health. Many of the data required for an E&HIA, if they exist, will be found in public

health databases, and collection of new data will need to be a collaborative enterprise between health environmental and planning agencies, proponents and communities. The framework neither suggests nor implies that all costs involved in its implementation must be borne by proponents. Since public health m y both benefit and suffer from any proposal, agreement for equitable distribution of costs of an E&HIA should be negotiated on a case-by-case basis depending upon the nature of the health information required and its likely future use to the community. Chapter 2 discusses options for resourcing E&HIA.

The framework recognises the need for proponents, whether from government, community.or industry, to retain the guarantees and certainties which are offered by Schedule 3 of the Inter-Governmental Agreement on the Environment (IGAE). It offers guidance on the process for conducting an E&HIA which will allow each of those guarantees to be preserved while ensuring that communities and health agencies can be confident that public health protection has been a criterion in project approval. The data requirements, methods, outcomes and resourcing of m E&HIA will always be project-specific.

Background and philosophy

Healthy environments and healthy populations are interdependent. Ensuring that environmental degradation will not occur and that public health will not be adversely affected by planning decisions requires more than simply preventing or countering the problem of environmental pollution; it also involves the active maintenance and where appropriate promotion of health through improved social amenities and living and working environments. h ecological approach which assesses the impacts of development on human habitats is as necessary for the protection of human health, both community and occupational, as environmental impact assessment is to the protection of flora and fauna.

The Draft Australian National Strategy for Ecologically Sustainable Development (ESDSC 1992, p. 104) recommends that: 'Health Impact Assessment should be incorporated explicitly into any environmental or economic decision making process'.

The extensive consultation with actual and potential stakeholders and participant groups both in EIA and in E&HIA which underpinned this report showed a clear consensus on two points: environmental and health impact assessment in some form is essential; and current procedures, resources, and knowledge and skills bases are demonstrably inadequate to address the task. (See Appendix 1 for details of the consultation process).

The philosophy underlying the proposed framework for health impact assessment reflects key principles of public health recognised in international documents such as the Ottawa Charter:

- Human health and the environment are interdependent.
- Most changes to local or global environments are likely over time to affect human health for good or ill.

- Human health is affected by social, psychological, economic, ecological, and physical factors.
- Human health is a basic requirement for, and imperative of, ecologically sustainable development.
- Decision-makers have a responsibility to involve potentially affected communities in decisions which have an impact upon the health and amenity of their environment.
- Social justice is a key consideration in public health policy and ecologically sustainable development.
- Decisions should err on the side of caution when impacts on health and the environment are not clearly understood.

E& HIA requires, therefore, a commitment from many sectors.

Incorporating health in EIA

The overriding principle in developing E&HIA is that HIA should not be a parallel or stand-alone process but rather an integral part of EIA. This will be most effectively brought about by:

- established policy frameworks aimed at ecologically sustainable development and public health protection;
- legislation which requires public health impacts to be addressed explicitly in EIAs;
- development of guidelines to assist proponents and assessing agencies to identify and address appropriate areas of health impact;
- development of formalised avenues for access to health expertise and community input at all relevant stages in the EIA process; and
- clarification of the roles of the various government agencies.

Successful implementation of E&HIA will require proponents, communities and appropriate public authorities to collaborate in providing the information necessary for a reasonable and cost-effective assessment of public health risk, and where appropriate, for public health surveillance of clearly identified indicators related to potential risks.

Many traditional impact assessment practices will be difficult to implement with respect to human health. For example, monitoring to detect health effects post-development will be complex because of both the lag time before health effects develop, and the mobility of populations. Individual proponents of developments cannot reasonably be expected to monitor communities that are subject to the effects of multiple developments and whose composition is continually changing. The most effective protection of human health will be through broader social planning and monitoring, with individual projects being assessed against within an established policy framework (RAC 1992).

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The global priority areas for environmental planners identified by the European Charter on Environment and Health (WHO 1990) provide priority considerations for E&HIA criteria, guidelines and strategies. The areas include:

- the impact on environment and health of
  - global ecological disturbances;
  - energy options;
  - transport;
  - agricultural practices;
  - persistent chemicals;
  - biotechnology;
- urban development, planning and renewal;
- safe and adequate drinking water and hygienic waste disposal;
- water and air quality;
- microbiological and chemical safety of food;
- contingency and disaster planning;
- cleaner technology.

Resourcing E&HIA

The proposed protocol for E&HIA does not shift the burden of public health maintenance to proponents. More cost-effective planning and implementation of proposals and sharing, collating and monitoring of data on health outcomes will result if proponents and health agencies work together with common goals for public health and the advancement of knowledge in E&HIA.

Proponents of proposals, be they government or private, generally bear the costs associated with EIA and, increasingly, with environmental audit. Assessment of health impacts is obviously a legitimate component of EIA, and should be incorporated into its cost structure. The open-ended nature of health impact assessment requires, however, that clear boundaries of proponent responsibility be identified at the outset so that the certainty and efficiency of the process are guaranteed as stated in Schedule 3 of the IGAE.

Many of the responsibilities inherent in HIA belong in the public health arena, at all stages of the process, from development of project proposals to project after-care. It is not reasonable to expect proponents to pay for investigation of health criteria which are not directly affected by their project, or to address the more complex issue of regional or catchment area assessment for population health purposes. Such broader range assessments must be the responsibility of authorities charged with the protection of the health of the public, and should be implemented by them and resourced according to relevant public policy and legislation.

Extensive use should be made of existing data and data generated by public health research and health authorities. The extent of the need to collect new data for the E&HIA and responsibility for cost-sharing should be clearly identified as part of the scoping exercise.

Methods for resourcing community participation in E&HIA should be determined at State and local levels in consultation with all parties. Options which have merit are application of a designated percentage of tie total E&HIA cost to financing public participation and support, and incorporation of tie E&HIA agenda into existing public authority and local government community development program.

Safeguards will be needed to protect both proponents and tie public from misuse of the legal system, and its costly implications. Early collaborative planning by proponents m consultation with scoping teams (see Step 2 Scoping, p xxv) is recommended to forestall later disagreement and expensive legal challenge.

Resource options for health auditing and monitoring

Decisions about resourcing of health monitoring need to be project-specific. Where known health risks of contamination can be measured by known biological momtoring methods, it may be appropriate to incorporate financial responsibility for that monitoring into a development consent. A lead smelter, for example, could be required to finance periodic surveys of soil-lead contamination and child blood-lead levels in affected areas.

More commonly, however, a project is simply adding to the potential environmental health burden of a community. In these circumstances, monitoring the health of that community should be the responsibility of local and regional health authorities and could be financed by some combination of costs levied on proponents, consumers, communities and governments, along with economic instruments such as development application fees, licensing fees, or environmental health development levies, which provide incentives for proponents to maintain healthy environments. In the past such levies have been aimed at cleaning up existing pollution and environmental damage. A significant shift m perspective would be needed to permit their application to the health sector. The resource implications of regional public health monitoring are beyond the brief of this document; decisions in this area must be debated and determined by State and federal policy-makers.

Indirect resource options for E&HIA

Indirect resource requirements may be more difficult to satisfy since they derive from the inadequacy of the public health infrastructure and human resource base in environmental health. Three approaches will be needed:

- ***Redeployment of existing resources***
  Some progress towards implementing E&HIA could be made by more effectively organising the resources which currently exist. Local authorities, including local government and regional health units, could collect much of the baseline data as part of their routine public health and regional planning roles, if they had access to technical advice and common data collection and management protocols. Existing expertise in health agencies needs to be supported by readily accessible networks in biology, toxicology, water resources, geology, entomology and other relevant disciplines.

Existing networks m community health and welfare, ethnic services groups, school councils, local conservation officers and health promotion officers could all be oriented towards an environmental health perspective in their community development work.

- *Education and training*
  A large number of professional groups is involved currently in environmental science and environmental impact assessment, and a growing and multi-disciplinary workforce m public health is also emerging m Australia. Relatively few of these people, however, have any expertise in environmental health or policy. In local government, environmental health officers (formerly public health inspectors) and those involved in planning departments represent a large environmental health workforce. Each of these groups requires supplementary training or retraining to perform the functions identified in the proposed framework.
- *Expansion of the knowledge and methodology base through research and development*
  Areas needing particular attention include identification and measurement of community health indicators; evaluation of health effects of specific environments, contaminants or procedures; and economic methodology for cost-benefit assessments in environmental health risk analysis.

Australian regulatory frameworks for EIA and HIA

The regulatory frameworks governing EIA and HIA, and their practice m the Commonwealth, States and Territories of Australia, are complex, and lack uniformity m both content and administrative structure. They are reviewed m Chapter 3. There are, nevertheless, some common problems including:

- the inadequacy of current mechanisms for collaboration across sectors, agencies or departments (planning, health, environment);
- the lack of information (or access to appropriate expertise) and/or suitable methodologies to assess health risks;
- the difficulty of ensuring adequate and representative community involvement;
- the need to identify appropriate roles for local government in environmental health;
- the lack of adequate methods for dealing with cumulative and synergistic impacts on health;
- the need for post-implementation monitoring and post-closure of projects, with the dual aims of evaluating the impacty assessment and documenting outcomes to improve subsequent risk assessments.

The framework for E&HIA proposed in this document addresses some of these problems; however basic changes in the infrastructure for environment and planning, legislation, and administration are beyond its scope, and must be addressed by the National Environment Protection Agency.

Towards a more integrated approach: principles for implementation of E&HIA

Health Impact Assessment must be part of Environmental Impact Assessment in order to avoid unnecessary cost, inconvenience, delays, legislative complexities and uncertainties of responsibility. Even an integrated system of E&HIA, however, will be unable to address many environmental health problems whose solution rests ultimately with progressive policy development and the advancement of Ecologically Sustainable Development (ESD).

The Inter-Governmental Agreement on the Environmental provides a mechanism to set uniform national goals, standards and guidelines for air, water, contaminated land, disposal of hazardous waste, motor vehicle emissions and waste minimisation. The Agreement focuses largely on statements of principle and definitions of responsibility between the Commonwealth and States. Its principles will be integral to the National EPA (NEPA), a consultative council of government ministers from the States, Territories and Commonwealth with representation also from local government. NEPA will publish draft standards, guidelines and environmental goals accompanied by an impact statement for its proposals.

The Commonwealth EPA (CEPA) is an advisory and technical body which addresses environmental issues and long-term solutions. It is to be the national central contact body on issues such as biotechnology, EIA, public education, industry guidelines and hazardous waste disposal. Health considerations are an integral component of all of these. It is also to develop environmental monitoring databases and institute a State of the Environment reporting system. CEPA's activities are designed to complement and support those of other agencies, including NEPA, and its functions and policies are to be developed in consultation with them.

Governments at Commonwealth, Territory and State levels are concerned with establishing appropriate policy and planning frameworks for EIA. In many cases this is being done by establishing bodies such as EPAs to coordinate and integrate environmental management.

The following principles reflect specifically the priority concerns in the implementation of E&HIA. They are supplementary to, and should be read in conjunction with, the principles for EIA outlined in the National Approach to Environmental Impact Assessment developed by the Australian and New Zealand Environment and Conservation Council (ANZECC 1991, see Appendix 4). Like the national principles for EIA, the principles for E&HIA are 'forward-looking in scope and intended to provide incentive to all governments in ensuring that the EIA process provides the environmental [and health] perspective that is sought' (ANZECC 1991).

Principles for public health authorities

- In consultation with affected industry and community bodies, formulate environmental health goals and targets and environmental health components of the national guidelines for **EIA** to assist assessing authorities and proponents in identifymg proposal-specific key objectives, indicators, criteria and processes for health impact assessment.
- Provide technical information and expertise in a form which will assist and support public involvement in prediction, assessment and monitoring of health impacts of proposed developments.
- Identify specific population groups which are particularly vulnerable to adverse health impacts of specific developments.
- Work with the public, industry, and environment and planning agencies to develop and legislate standards based on known or predicted health effects for given geographic conditions and population groups rather than point-source emission limits or ambient measurements at source.
- Develop indicators and national databases to facilitate health impact assessment.
- Participate in intersectoral assessment of proposals and coordinate the evaluation of technical material in relation to physical and social and cultural impacts on the health of populations.
- Study developments retrospectively to assess the scale of actual health impacts (including benefits), and to build up an epidemiological database to guide future E&HIAs.
- Facilitate and encourage the development of protocols and strategies for regional environmental health monitoring.
- Develop expertise and methodologies to assess health risks: biological and social and cultural as well as synergistic and cumulative.
- Participate in a program of workforce planning, education and dissemination of information for participants in the E&HIA process.
- Participate in public education strategies aimed at assisting community networks to participate more effectively in E&HIA.
- Participate in identifying priority areas for research and development related to the National Health Goals and Targets for Environmental Health.

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Comment

Environmental health is, by its nature, an area m which the public has a considerable and legitimate interest. Public consultation is therefore both legitimate and necessary throughout the process, from the development of planning policies to the evaluation of project outcomes.

As well as formulating key objectives, indicators and processes for E&HIA, it is also necessary to identify vulnerable groups and their health risks and to ensure that social justice factors which underlie these risks are taken into account m development policy and decisions.

Impact assessments should comment specifically on potential effectson human health rather than simply predicting or reporting data on point source emissions and ambient levels of pollutants. Legislation should support this principle.

To facilitate E&HIA, public health and medical research authorities should adopt as a high priority the development of indicators of community health. Those data which are available, based on public health surveillance linked with pollution incidence, and epidemiological and geographic assessment of disease clusters, should be aggregated and accessible in a national environmental health database.

Environmental health has broadened its sphere of concern from a focus on the impacts of environmental pollution (chemical, physical and biological) to a more comprehensive view which includes the promotion of health through improved housing, living, working and public environments. This broadened view is integral to E&HIA guidelines, and it implies the involvement of sectors other than health as potential resources in the E&HIA process. Health authorities should, however, play a coordinating role since they have the necessary expertise to provide health-related technical guidance to decision-makersand proponents, and to assess health problems and their environmental determinants.

Public health authorities need to monitor the constantly evolving indicators of environmental health, and refine progressively the predictive capabilities of these indicators. E&HIA should, therefore, be followed by health impact auditing after the implementation of the project. Ongoing auditing is essential both to ensure compliance with the conditions of development project and to build up the databases which will serve to improve the predictive ability of future HIAs. Explicit attention to the ownership of this responsibility, its organisational aspects and its cost, is essential.

Principles for assessing authorities

- Provide clear guidelines on the types of proposals likely to attract health impact assessment, and on appropriate levels of assessment.
- Provide a clear outline of the E&HIA process, and proposal-specific guidelines focussed on key issues and incorporating community health and amenity concerns.
- Incorporate m guidelines a specific requirement to address nominated proposal-specifichealth impacts and health-related criteria. In particular:
  - qualitative criteria should be set after consideration of the total pollution burden of air, water and soil in the affected region, and within the context of regional (or catchment area) environmental goals for public health;
  - site analysis should take account of proximity to sensitive community facilities such as schools and housing estates.
- Ensure that public health impact is monitored and the results assessed by the health authority, and that feedback is provided to improve environmental health assessment and management procedures.

Comment

Health authorities should have a formal role m establishing general guidelines such as capture criteria for E&HIA, m formulating assessment guidelines for specific proposals, and in evaluating the E&HIA and the project outcomes. Existing national health-related guidelines and standards such as those developed by NHMRC, NOHSC and ANZECC should be incorporated m guidelines for proponents.

Principles for proponents

- Incorporate occupational health and public health factors fully into proposal planning, which should include a proper examination of reasonable alternatives.
- Make and implement a commitment to avoid public and worker health impacts; or where this is not possible, ameliorate, monitor and if necessary compensate for impacts in compliance with development conditions.
- Identify, implement and periodically review responsible corporate occupational and public health policies, strategies and management practices.

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Comment

Proponents are responsible for preparing and presenting the case for the assessment of their proposal. The case should include:

- a description of the existing status of those aspects of the health of the affected community which are designated by the scopmg team;
- predictions of occupational and public health impacts and their consequences, with an estimate of the uncertainty involved;
- an assessment of tie benefits and risks to human health of reasonable alternative options.

Principles for the public

- Participate in the planning and evaluation of proposals and where appropriate, comment on how a proposal might more effectively protect the community's health and amenity concerns.
- Participate in baseline studies and ongoing monitoring of community health status.
- Participate in tie development of strategies aimed at understanding and negotiating differing perceptions of risk and of costs and benefits.

Comment

h addition to those objectives identified for EIA, public participation in the E&HIA process should aim to:

- ensure that public health issues are raised and addressed;
- assist in providing decision-makers with better public health advice;
- enable the public both to advise on and learn more about environmental health issues.

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Principles for Governments

- Provide a set of national Coals and Targets for Environmental Health.
- Participate in development of national standards for assessment and monitoring of environmental health determinants.
- Provide policy and planning frameworks for the environmental health assessment of proposals.
- Where E&HIA shows that proposals have potentially significant health impacts, base decisions regarding such proposals on advice resulting from the E&HIA process, and include provisions for effective protection of public health.

Comment

The principles of E&HIA can be applied to proposals not normally subject to a formal EIA process, and State and local government agencies can increase their role in public health protection by adopting these principles.

The quality and efficiency of the E&HIA process depends on useful public health and environmental health databases. Broad cooperation between agencies and governments is needed in setting of environmental health goals and standards, and m establishing inter-agency networks of expertise and comprehensive systems for gathering, storage and retrieval of data.

National practice for E&HIA in Australia

In addition to the points outlined in the ANZECC national framework for EIA (ANZECC 1991, p. 9), application of the principles of health impact assessment to projects, programs, plans and policies will require the following:

- development of industry guidelines which incorporate public health concerns;
- the specific inclusion of public health impact assessment in legislation;
- the integration of public health concerns into government programs;
- determination and public announcement of criteria for the protection of public health which can be both enforced and audited;
- mandatory incorporation of public health advice into decision-making by Ministers and responsible authorities.

Other mechanisms such as municipal planning processes, health promotion, and community development activities can contribute significantly to implementation of the objectives of E&HIA, and should be reviewed regularly to ensure that this potential is realised.

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Part II

Steps in conducting E&HIA

The framework set out below has been designed to integrate with the usual phases of EIA, and each step in the process is not intended to stand alone, but to be integrated into the relevant part of the existing EIA process.

Summary of the proposed framework for E&HIA

Step 1 *Screening*
Does this project need an E&HIA?

Step 2 *Scuping*
What issues must be addressed in the E&HIA?

Step 3 *Profiling*
What is the current status of the affected population and the local environment?

step 4 *Risk assessment*
What are the risks or benefits?
Who will be affected?

Step 5 *Risk management*
Can risk be avoided or prevented?
Are better alternatives available?
How can benefits and risks be costed?
How can differing perceptions of cost and benefit, nature and magnitude be mediated?
Will predictions of future health risk be robust enough to withstand legal and public scrutiny?

Step 6 *lmplmentation and decision-making*
Does the assessment provide sufficient, valid and reliable information for decision-making?
Is there a conflict to be resolved?
How will conditions be enforced?
How and by whom will impacts be monitored?
How will post-project management be resourced?

step 7 *Monitoring, environmental and health auditing, post-project evaluation*
Is the project complying with its conditions?
How well is the E&HIA process as a whole achieving its aims of protecting the environment and health?

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Multi-sectoral involvement is essential in planning and assessing each step in the impact analysis. Scoping teams or consultative committees need to be convened in the earliest stages to guide the planning of the development and identify key issues to be addressed by the E&HIA. This will facilitate consensual rather than confrontative approaches to decision-making and development. Access to baseline data on public health before development is highly desirable in order both that the impacts of the particular project can subsequently be evaluated, and that the overall capacity to monitor environmental impacts on health on a national basis is improved.

Step 1: Screening

Does this project need an E&HIA?

Screening aims to identify, as early as possible, those projects which have potentially significant impacts, and which should be subject to E&HIA.

Screening consists of:

- Rapid assessment:
  - against a checklist of criteria for public health risk which establish the need for E&HIA;
  - in the light of local demographic data, to identify vulnerable populations;
  - in the light of local environment data, to identify vulnerable ecosystem where damage has the potential to cause health effects.
  - of public interest and/or concern;
  - of contribution to disturbances to the global environment.
- Establishing contact with community networks.

The screening process should be established by relevant authorities in association with health authorities. Accountability to the public by those authorities should be established through mechanisms which allow the community to satisfy itself that decisions made at this stage comply with legislative requirements.

Not all potential impacts on health are negative. Many developments, for example improved waste disposal or water supply facilities, may result in benefits which outweigh potential adverse effects. It is as important to identify the potential positive health impacts as the negative ones, and this may make a significant contribution to the cost-benefit analysis and final development decision.

An element of judgement will always enter into decisions at the screening phase. The checklist below identifies key concerns for public health which should be considered. It is consonant with the *Guidelines for Identification of Enuironmental Significance* promulgated by CEPA (see Appendix 5).

For each type of proposal, health authorities should be responsible for providing a rapid assessment checklist of key potential health effects. The scopmg team (see Step **2,** below) should then include these in the brief to the proponents.

Projects that should be screened by health authorities

Developments, activities or policies which:

- generate desirable health impacts such as water supply or waste minimisation/disposal;
- may cause substantial changes to the demographic or geographic structure of a community;
- have the potential to expose workers to hazardous products and processes in the workplace;
- open settlements or areas which have the potential to damage ecology, reduce air or water quality to an unacceptable level, introduce disease vectors or parasites, or render recreational facilities and water resources unsafe;
- impact significantly on populations which are already vulnerable to ill health (eg rural Aboriginal communities, retirement communities);
- impact significantly on land productivity for horticultural and pastoral activities and are potentially detrimental to the socioeconomic status of dependent communities;
- affectthe microbiological or chemical safety of food chains and food supplies;
- substantially increase the demands on public amenities and infrastructure;
- involve the storage, transport and disposal of hazardous or toxic materials or wastes, including those that are clinical and infectious;
- produce particulate, gaseous or liquid emissions, a significant volume of solid waste, or noxious substances (eg radiation);
- generate significant noise, traffic flow, or risk of injury;
- generate a high level of community concern (eg airports, freeways).

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Step 2: Scoping

What issues must be addressed in the E&HIA?

Scoping identifies the issues to be considered in depth and those to be eliminated, and it allocates responsibilities for preparing the assessment (Ross 1991). It offers the first opportunity for community participation in the assessment and planning of a proposed development. Scoping teams should be constituted from proponents, groups of experts and representatives of communities or workers who will be affected by the proposal, as it gives stakeholders the opportunity to identify areas on which the E&HIA should focus.

A checklist of potential health and amenity concerns is provided in Chapter 4. The checklist is an aid to identification of those issues which may be relevant to specific proposals.

Tasks in scoping

- Identify key stakeholders.
- Identify potential health and amenity concerns.
- Determine whether modifications or alternatives to the proposal need to be considered.
- Provide guidelines for the proponent specifying:
  - goals for impact assessment and criteria for monitoring;
  - minimum information requirements;
  - nature and location of relevant existing health data;
  - relevant bibtechnical standards and inventories;
  - relevant social and cultural impact indicators;
  - relevant biological and social assessment methodologies;
  - recommended consultation strategies;
  - recommended project implementation, evaluation and monitoring protocols;
  - local agency requirements and policies.
- Determine the responsibility of proponents, health agency and other stakeholders in the preparation and assessment of the E&HIA.
- Negotiate costs and cost-sharing.

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Step 3: Profiling

What is the current status of the affected population and the local environment?

Profiling is the process of establishing the baseline condition of relevant parameters of the affected community so that likely impacts can be predicted and subsequently monitored. The term is derived from social impact assessment.

It will be necessary to involve local stakeholders and relevant community groups and agencies to gather the relevant information. Many of the data for profiling should be available from local health and planning authorities. Not all of the information listed below will be needed in every case, and much of it may not be available. The list should be viewed as an ideal towards which developing datasets could be targeted. It is not implied that proponents be responsible for compiling those datasets but should refer to them where they are available, relevant and identified by scoping teams.

Baseline information which contributes to profiling

- Characteristics of the populations of the region, including size, age structure, socioeconomic status, groups at risk.
- Physical characteristics of the region, such as frequency of atmospheric inversions, variability of river flow, orientation of prevailing winds, water tables, geological stability.
- Existing land uses, especially those that can be considered incompatible with or inappropriate to the proposed development.
- Current health status of the population, including morbidity, mortality, and social health indicators. (Data collection using sentinel populations which is coordinated by a central body would be useful here.)
- Current levels of pollutants and environmental degradation.
- Existing data and studies concerning the types of problem likely to arise from the development. The reliability of these data needs to be carefully considered, especially if they relate to a region or population which differs from that for which E&HIA is being carried out.
- Existing living conditions of the population especially in relation to factors such as access to water and food supplies, and access to health facilities.

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Risk analysis

Risk analysis plays an important but somewhat controversial role **m** environmental health. Currently, it is the primary tool for providing quantitative data aimed at identifying and mitigating environmental health hazards. In any risk analysis, however, there are **a** number of points at which risk to human health can only be inferred, and both scientific judgements and policy choices **may** involve selecting from a number of options.

Risk analysis involves both the technical procedures of quantitative risk assessment and the social processes of negotiating criteria for acceptability of proposed policies and developments. To date, most impact assessment has been deficient in its incorporation and assessment of the non-technical components, and m its acknowledgment of the methodological limitations of the technical components.

Methods have yet to be refined for assessing the externalities, human and environmental, as well as the monetary costs, and incorporating them into cost-benefit decisions. Methods for ensuring genuine consultation with communities and their participation in decision-making are also embryonic. There are broad gaps **m** the data about dose-response relationships between specific exposures and identifiable population-health effects, and the capacity to predict cumulative health impacts on either a spatial or a temporal basis is minimal.

For these reasons it is critical that, where commercial confidentiality is not a genuine factor, risk analyses and follow-up be regarded as 'action research', providing baseline data and refining methodologies for future impact studies.

Risk analysis is best understood in two phases:

- **risk** assessment and
- risk management.

Step 4: Risk assessment

What are the risks or benefits?
Who will be affected?

Risk assessment is the identification of hazards and the estimation of the degree and frequency of risk they pose. This is predominantly a quantitative scientific enterprise. The process will vary with the proposal being assessed and with the availability of data to aid in evaluating options. Hard and fast rules cannot be applied, but use of the checklist in the **risk** analysis box below is recommended. Some of the necessary information should be available from public health plans (if they exist), some will be available from published sources.

Dealing with uncertainty in risk assessment

Risk assessment involves many uncertainties, due in part to the deficiency of available datasets, the uncertainty associated with the data that are available, and the fact that although **risk** assessment attempts to be rigorously scientific, it inevitably involves value judgements. 'Correct' choices are a matter of perspective, and different stakeholders frequently have different perspectives. In some cases

dispute is inevitable. The grounds for dispute, however, can be minimised or clarified by attention to certain details in the communication of risk assessment data. Thus (Harvey 1990):

- assumptions and scientific judgements should be stated clearly;
- the nature and magnitude of uncertainties must be delineated;
- risk assessment and risk management should both be addressed;
- the choice of a particular risk assessment methodology over alternate methodologies must be explained m non-technical language;
- risk estimates should be presented to afford comparison of risks;
- the role of risk assessment in decision-making should be specified;
- the agency responsible for decision-making should be clearly identified and publicly accountable.

Step 5: Risk management

Can risk be avoided or prevented?
Are better alternatives available?
How can benefits and risks be 'cosfed'?
How can differing perceptions of cost and benefit, nature and magnitude be mediated?
Will predictions of future health risk be robust enough to withstand legal and public scrutiny?

Risk management is the process by which a regulatory agency and community decide what to do about the results of a risk assessment. Decision-makers and interest groups develop policy, guidelines or management procedures, based on the results of risk assessment combined with feasibility and economic and socio-political realities. Risk management involves values, social and political considerations, community concerns and economic judgements, and is subject to the constraints of particular statutes. It entails forming and implementing a strategy for accepting or mitigating identified hazards.

Risk analysis

Step **4** — Risk assessment

Hazard identification: Is there sufficient evidence to suggest that a hazard will occur?

- analysis of properties of the development/agent
- epidemiological evidence of risk
- toxicological evidence of risk
- case reports.

(continued

Risk analysis *(continued)*

Risk estimation: *What is the likely extent of risk?*

- is the risk new or ***m*** increment on existing risk?
- impacts on environment
- dose-response or dose-effect relationships
- population exposure and sensitivity
- at-risk groups
- land use, lifestyles, consumption patterns
- route, magnitude, frequency and duration of exposure
- probability and consequences of accidental events.

Step **5** — **Risk** management

Risk characterisation: *Is it the best option, is it worth the* ***risk?***

- public perception of risk
- risk-benefit analysis, incorporating health effects and effects on the human population as a cost item in personal and economic terms
- feasibility of alternatives
- social, political, and cultural implications of options
- uncertainties and assumptions
- social justice and equity.

Risk mitigation:

- modifying:
  - land-use planning
  - the proposal
  - the environment
  - exposure
  - effects
- mitigating effects (including compensation)
- formulating or developing:
  - emergency procedures for acute exposure
  - contingency measures to facilitate detection and timely response to potential problems
  - site-monitoring mechanisms to address project closure, risk removal and environmental restoration
  - control measures aimed at building public confidence and trust in the approach taken to project management

(continued overleaf)

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Risk analysis *(continued)*

- incorporating in project approval conditions:
  - recommended modifications
  - criteria and methodologies for health impact audits.

Step 6: Implementation and decision-making

Does the assessment provide sufficient, valid and reliable infomation for decision-mating?
Is there a conflict to be resolved?
How will conditions be enforced?
How and by whom will impacts be monitored?
How will post-project management be resourced?

Information required by decision-makers

The aim of E&HIA is to provide the decision-maker with the best possible information on environmental health effects of the proposed development, and on the possibilities for preventing or mitigating these effects. Information required includes:

- Information about all the predicted impacts of carrying out the development (including mitigation measures and cost-benefit trade-offs).
- Identification of those impacts which are crucial to the decision.
- Illustration of ways in which the decision might be affected by different judgements about the relative importance of impacts.

Enforcing compliance with development conditions

A number of instruments are available to enforce compliance with development conditions. Problems arise more in relation to lack of satisfactory mechanisms for measuring compliance. E&HIA approvals should specify conditions and criteria for compliance. Human health indicators should be used where they are available and feasible, in addition to more traditional criteria such as point-source emission limits.

One of a project's most significant impacts may be the condition and use of its land after the project is complete. There is currently considerable concern over public use of land which has been contaminated in the past by mining activities, waste disposal or industrial use. Project closure and site clean-up are thus important considerations in any E&HIA.

Compensation

Compensation can lessen the impact and hardship which may result from implementation of a project. It should be used in addition to, rather than instead of, mitigation measures. Likely compensable impacts and appropriate extent and forms of compensation should be identified as part of the scoping exercise. A discussion of the ethical and practical implications of compensation is provided in Chapter 4.

Step 7: Monitoring, environmental and health auditing, post-project evaluation

Is the project complying with if sconditions?
How well are fhose conditions achieving the desired outcomes?
How well is the E&HIA process as a whole achieving its aims of protecting the environment and health?

Monitoring and evaluation are integral components of environmental management, since they reveal the accuracy of predictions and appropriateness of decisions based on E&HIA. Techniques such as environmental sampling, surveillance of a marketed product, ongoing epidemiological studies, and evaluation of newly-available health-risk information are employed to monitor outcomes, while new information about risks may lead to earlier decisions being reviewed (Health and Welfare, Canada, 1989).

Routine monitoring of general health conducted by health authorities can provide a baseline against which to assess anticipated project outcomes. Ongoing health monitoring is the responsibility of health authorities. E&HIA approval conditions should identify any specific responsibilities for monitoring project-specific indicators (eg blood lead levels) which might be the responsibility of proponents.

Environmental auditing

Environmental auditing can be defined as the systematic exammation of a project, and of process performance in satisfying and achieving environmental goals. In order to achieve this, the state of the existing environment and the health of the affected population needs to be assessed to provide a baseline against *which* compliance with an environmental impact statement can be checked. This baseline c m also be used to assess the accuracy of environmental and health impact predictions, and the effectiveness of mitigation measures used to reduce the impact of a development upon the environment (Read 1991). The objectives of environmental auditing are outlined in Chapter 4.

Bisset **and** Tomlinson (1988) suggest that an **EIA** should generate hypotheses about a number of aspects related to the impact of a development upon the environment. These hypotheses should include the magnitude of the impact, the probability of its occurrence, and its environmental significance. Auditing should then be directed towards testing those hypotheses. **All** impact assessments should incorporate a follow-up program of this type, with particular focus on those aspects which the E&HIA has shown to be associated with uncertainty. The follow-up program should check the validity and accuracy of the project's forecast impacts and the adequacy and effectiveness of the implementation measures. Where necessary, it must also develop measures to mitigate impacts which had not been foreseen. (Ministere de L'environnement du Quebec 1989). Financial responsibility for such follow-up should be determined on a case-by-case basis and should be specified in project approvals.

Existing obstacles to achieving ideal environmental audits are discussed further in Chapter 4.

Health auditing

For developments which are likely to affect significantly the health or amenity of regional or local populations, environmental auditing should include health auditing, whereby the health status of the population is assessed at regular intervals and compared with the health of that population before the relevant development. With the exception of easily identifiable specific effects attributable to specific developments health auditing would normally be the responsibility of public health authorities. Health monitoring, by contrast, is recommended currently only where environmental or biological monitoring indicates a significant risk of effects; for instance, renal function tests are indicated if environmental cadmium levels are above levels of concern. Biological monitoring has limited application: it measures the uptake of contaminants, or their metabolites, and people's individual responses to them, and is most useful in monitoring chronic exposure to substances with long biological half-lives. The only substances suitable for biological monitoring are lead, cadmium, arsenic, mercury, polychlorinated biphenyls (PCBs), organochlorine pesticides and organophosphorus pesticides.

Health auditing or monitoring of health impacts must be regarded as a research enterprise as well as an attempt to evaluate E&HIA and specific developments. The existing knowledge base and methods in the field are at a very early stage of development, and all available data should be harnessed to build national and international capabilities. The responsibility for health auditing clearly extends beyond the proponents of specific developments. In some cases approval conditions may specify a proponent's specific responsibility, but the background responsibility for health auditing rests with the public health authorities.

The effective implementation of health impact assessment policies and methodologies depends ultimately on our ability to develop adequate indicators and measurement methods for monitoring population health. Health impact auditing should be seen as contributing to broader goals rather than simply evaluating the implementation of specific developments. The WHO has taken a leading role in developing methods and databases for health impact auditing, but highly urbanised and industrial countries such as Australia, with relatively sophisticated health care systems, should adopt a proactive role in developing those methods for export.

We are at the very beginning in the development of processes to achieve effective environmental health monitoring. Priority areas for development are:

- individual project indicators for specific developments;
- broader-based generic indicators of population health; and
- ways to link health to existing environmental monitoring systems.

The ability to recognise, characterise and reverse adverse environmental health impacts is the most pressing issue facing health professionals into the next century.

The biomedical scientific model which underpins most of our existing health care services has a contribution to make in tie development of biological monitoring technology and early diagnostic warning signals. Similarly planners, geographers and ecologists must continue to refine their methods for environmental monitoring, and community advocates and groups must continue to strive for effective participatory planning. All groups will need new multi-disciplinary skills to address the problem involved in preventing and monitoring the adverse impacts of development on human health.

Part III

Evolving methodological issues in E&HIA

Strategies and processes for community consultation

Community consultation enables the community to comment on development plans. These comments can be used as part of the broader process of social and health impact assessment, which also incorporates other indicators of well-being and demographic status. Community consultation m y have impacts of its own including 'forcing our political system and planning activities to adapt to new public demands and changing values' (Priscoli **1983).** Currently community consultation usually occurs late in the process when plans and important decisions are often too far advanced to be changed easily. This leads to confrontation between communities and proponents which can be very costly in terms of finance, delay and public relations. This framework recommends early consultation to encourage collaborative rather than confrontational interaction; and if this is well managed, it m y reduce the costs of community consultation through avoiding unnecessary delay legal challenge and poor community relations.

The costs of community consultation are potentially open-ended and, in keeping with the principles of Schedule **3** of the IGAE, proponents need to be protected from unreasonable expense or delay in the course of an E&HIA. At the scoping stage of the E&HIA process guidelines for community consultation should be established and time and cost limits negotiated. In some cases this m y involve a set proportion of the total cost of the E&HIA, in others it may involve provision of funding assistance for community groups to assess information. A range of such options should be identified in State E&HIA legislation.

There are no hard and fast rules for successful community consultation but the following guidelines should be followed as a minimum.

Guidelines for effective consultation

- Risk communication needs to focus on what information is required, and how it can best be provided, to enable the community to make informed choices.
- The community needs to be made aware of, and exercise, its responsibility to influence decision-making, and to facilitate health surveillance activities.
- Discrete communities must acknowledge social equity considerations that are broader than their particular community.
- Non-negotiable aspects of a development should be identified early in the process of community consultation. These aspects need to be clear and well substantiated. For example, the need to provide housing for disadvantaged groups in a particular type of location may be non-negotiable, although where and how this housing is provided may be negotiable.
- The community should be informed about the reasons for consultation before groups are invited to participate.
- Target groups should be involved in planning the consultation process to ensure that all parties have a clear understanding of, and are able to contribute to:
  - the proposed agenda
  - the role of the consultative body
  - the parameters of consultation
  - the expected outcomes of the consultation process.
- Appropriate consultation models should be selected for specific groups.
- Adequate resources should be available.
- Sufficient time and resources should be allowed to enable development of submissions and feedback recommendations and reports.
- The process should be evaluated to determine whether the community view has been accurately represented.

  (Bowman 1991)

Barriers to community consultation include:

- lack of resources, especially time, since community members who become involved are usually volunteers;
- the fact that some developments, such as plant expansion, may not be notifiable to the public;
- a lack of skills or confidence on the part of the public;
- a lack of trust in the consultation process; and
- conflicting perspectives of proponents and communities, which may lead to a reluctance to share information and decision-making.

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Each of these barriers needs to be addressed at least as part of public health community development objectives, and, m appropriate cases, through legislative regulations. Local government can play a significant role m educating and assisting community groups to analyse risk information and present their views within a rational framework.

Community involvement in monitoring currently operates informally when observed pollution incidents prompt public complaints to pollution control authorities. There is, however, a need for more active community involvement in momtoring. The information needs of communities must be considered, and mechanisms for disseminating information must be in place. Participation in statutory processes including planning approvals, licence conditions and emergency plans should be facilitated as part of the E&HIA process, and opportunities should be provided for mutual discussion and education between industry, government and the community. In some cases it may be possible to establish mechanism which allow the community to monitor the performance of a facility independently of industry or government. Emission of visible substances is one such example, where communities can be educated to take an active role m momtoring performance.

Standard setting

For the purposes of E&HIA, standards may be defined as guidelines or limits which dictate acceptable performance levels. Exposure standards are the product of a 'best fit' decision reached after consideration of the risk assessment data and the social, economic, political and technical evaluation of those data. Because each of these categories of information may change over time and because of the uncertainties inherent in risk evaluation, standards are rarely absolute. They are liable to change as experts and communities re-evaluate the acceptability of the risk, as more information about danger to health becomes available, or as technology becomes available which can lower the risk at a cost which the community is prepared to bear.

Standards should be set as a minimum; however a 'best practice' approach, with use of the best available technology, design and work processes, is the ideal which proponents should be encouraged to achieve.

Some conflict arises from the difficulty of setting standards that are acceptable to both the developer and the community Traditionally, pollution control legislation has been based on standards such as the ALARA (as low as reasonable achievable) principle, BEPT (best economically practicable technology) levels, or compliance with State and Territory regulations based on WHO or NHMRC guidelines. The assumption has been that the standards, if met, will be acceptable to the community and that the development will not pose an unacceptable risk to the community Similarly, with noxious or dangerous substances, it has often been assumed that compliance with occupational health and safety regulations to reduce risk to workers will also adequately protect those outside the plant. General community acceptance of these assumptions can no longer be assumed and community consultation in setting standards is now an important part of the process.

Setting environmental exposure standards

What is acceptable exposure or risk?

- Identify relevant national and international standards
- Discuss formal procedures and safeguards with local communities.
- Identify local standards — acceptable levels of risk are determined by community values, regional characteristics and economic considerations as well as scientific data.
- Note difficulties defining personal exposure versus ambient standards.
- Incorporate appropriate standards and agreed monitoring protocols into development approval conditions.

Local conditions which may require modification of standards

- Proximity of vulnerable groups, eg groups of children.
- Vulnerability of community, eg existing high burden of ill-health or socioeconomic disadvantage.
- Vulnerability of ecosystem, eg wetlands, national heritage areas.
- Geographic characteristics, eg dispersion patterns, vulnerable water supply, stressful climate conditions.
- Total environmental hazard load of the region defined by geographically determined carrying capacity.
- Other regional or local characteristics, as identified in the municipal public health plan.

Technical considerations in setting standards (McMichael 1991)

- Cumulative exposure — the same agent may be encountered via several routes and sources.
- Synergistic effects — interactions between disparate agents may increase risk.
- Safety margins must allow not just for uncertainties but for individual differences in response to exposure and genetic susceptibility which may affect screening, protection and discrimination.
- There are many more exposure agents than resources to evaluate them.
- Setting limits may encourage false confidence and remove incentives to reduce exposure below the designated limit, when risk is still present although diminishing; nevertheless, they are vital for ensuring minimum standards are met.
- Apparent inconsistencies may exist in public policy, eg higher exposure limits may be tolerated in occupational settings than in the ambient environment.

(continued)

Setting environmental exposure standards *(continued)*

- Exposure data may not be available or may be extrapolated from environmental monitoring rather than personal exposure.
- Epidemiological data are deficient for relating exposure, especially at low levels, to health effects. There is a lack of adequate epidemiological data on individual exposure.
- Values differ on what constitutes 'acceptable risk'.
- Public scepticism about the degree of accuracy and validity of quantitative risk assessment is increasingly evident.

Areas for further research and development

There is no question that the process of E&HIA is, as yet, an imperfect science with many areas of knowledge and method remaining to be developed or improved. Those areas include:

- definition and measurement of relevant desired public health outcomes;
- methods to monitor regional pollution;
- incorporation of community perceptions of risk into the decision-making process;
- effective community participation in planning and decision-making for development;
- assessment of risk, particularly for the newer industrial developments and chemicals where practical experience is limited;
- provision of guidelines for measuring exposure to environmental hazards.

Databases need to be developed which document:

- core methodologies for baseline studies, with all aspects for a particular type of development, including legislation;
- qualitative information to identify potential impacts from activities.

Research is needed into:

- the effects of pollutants on human health, particularly the synergistic effects of a number of pollutants — further epidemiological and toxicological studies are needed in this area;
- guidelines for conducting risk analyses — objectives, procedures, and methods for dealing with uncertainties are especially needed;
- better health indices to measure non-fatal, sub-clinical and social health outcomes;
- the effects of indoor air quality and climate, including the movement of indoor air pollutants (particularly in multi-family high-rise buildings), on disease transmission and general health;

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- the differential effects of environmental health factors on high-risk groups, and how such knowledge may be incorporated into E&HIA;
- the effects of urban layout (including density) on mental health;
- the impact on mental and physical health of more general societal changes arising from urban development.

The imperfect state of the art and science of E&HIA cannot, however, be used as an excuse not to engage m it. All efforts should be made to preserve and protect human health even if there are uncertainties m the process. Only by embarking on E&HIA studies will we develop the information **and** methods needed to ensure greater certainty and greater efficiencies **m** the development plannmg, approval and implementation process.

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1 Incorporating health into environmental impact assessment: background and philosophy

1.1 The need for HIA

Healthy environments and healthy populations are interdependent. Ensuring that public health will not be adversely affected by environmental degradation and urban development requires more than simply preventing or countering the problem of environmental pollution (chemical, physical and biological); it also involves the promotion of health through improved housing, living, working and public environments (WHO 1991c).

In 1991, the National Better Health Program, funded by the Department of Human Services and Health, while recognising existing health, particularly occupational health inputs to EIA practices, commissioned a report to recommend a protocol for incorporating assessment of public health impacts into the process of environmental impact assessment (EIA).

Several complementary initiatives involving other sectors of the Australian Government were also underway.

The Ecologically Sustainable Development (ESD) working groups examining the mining, energy production, transport, tourism, and manufacturing sectors identified the need for a more effective and comprehensive environmental impact assessment process. The *ESD Intersectoral Issues Report* (1992) noted the uneven spread of the effects of environmental degradation: 'Environmental impacts have disproportionate effects on the health of particular marginal groups of the Australian community' (p. 68); and it identified the need 'to achieve a situation where all materials, chemicals and products are managed so as to minimise adverse impacts on health and the environment' (p. 71). The Intersectoral Report specifically recommended that techniques for environmental impact assessment, including social and health impact assessment, be developed and evaluated as a priority. Consequently, the *National Strategy for Ecologically Sustainable Development* (1992) recommended that 'Health Impact Assessment should be incorporated explicitly into any environmental or economic decision making process' (p. 104).

Schedule 3 (which addresses environmental impact assessment) of the Inter-Governmental Agreement on the Environment (IGAE February 1992) focuses specifically on issues such as data collection and handling, resource assessment, land-use decisions and approval process, environmental impact assessment,

national environmental protection measures, climate change; biological diversity, national estate, world heritage, and nature conservation and states that impact assessment should include, where appropriate, assessment of health factors. To date, however, there has been no specific methodology proposed to implement the health component of Schedule 3 of the Agreement.

The Health Impact Assessment (HIA) protocol proposed in this report is compatible with both Schedule 3 of the IGAE (see Appendix 3) and with principles of ecologically sustainable development. In brief, the IGAE guarantees that, subject to future mutually compatible legislation, all levels of government will ensure that their EIA processes:

- are applied to the public and private sectors;
- provide guidance on the types of proposals requiring EIA;
- provide guidance on criteria for acceptability of potential impacts (standards, guidelines, protocols, codes of practice and regulations);
- provide or assist with proposal-specific guidelines and processes focused on key issues of public concern;
- alter established guidelines only in response to significant issues which arise;
- set time schedules early in consultation with proponents;
- require levels of assessment appropriate to the degree of environmental significance and public interest;
- place with proponents the responsibility for preparing the case required for EIA;
- provide full public disclosure of information except where there are legitimate reasons for confidentiality;
- provide opportunity for appropriate and adequate public consultation;
- develop mechanisms to resolve conflicts and disputes; and
- provide a basis for setting environmental conditions, establishing monitoring and management programs, and developing industry guidelines.

The Agreement also aims to avoid duplication, increase the consistency of approach and minimise time delays in environmental impact assessment. The proposed HIA protocol shares these objectives.

1.11 Development of this report

A broad definition of health has been adopted, encompassing social and psychological as well as physical well-being. Health impact assessment is grounded philosophically in the principles of modern public health, as set out by the World Health Organization (1989):

> **Good health and well-being require a clean and harmonious environment in which physical, psychological, social and aesthetic factors are all given their due importance.**

The report is based on a review of the literature, of relevant international practice, and of current arrangements in Australian States and Territories, supplemented by opinions obtained from a national survey of policy makers, industry, community

groups, and environmental, occupatibnal health and safety and public health practitioners. A draft document was produced and submitted for public consultation over a period of four months. There was substantial agreement both in the initial survey and from consultation comments on two conclusions:

- that HIA should be administered within the existing EIA process, and the development of national guidelines for HIA would be beneficial; and
- that national guidelines are an approach to eliminating some of the uncertainty inherent in EIA and HIA, increasing efficiency, pooling expertise and dealing with the trans-boundary nature of many impacts.

1.1.2 Applying the proposed E&HIA protocol

While the proposed protocol, general principles and commentary are comprehensive, the protocol is intended to be applied selectively and to be adapted to specific projects or proposals and to local circumstances. To this end, the following chapters describe a wide range of indicators, options and methods. It is neither feasible nor desirable for all E&HIA to follow an inflexible standardised protocol for assessment of health impacts. Rather, informed judgements should be made about those issues which are most relevant in each case. The protocol incorporates suggestions for early decision points at which those judgements are made by proponents, relevant agencies and affected communities.

It must also be emphasised that E&HIA is inextricably linked with public health and, in many respects, cannot be disentangled. Many of the data required for an E&HIA, if they exist, will be found in public health databases, and collection of new data will need to be a collaborative enterprise between health agencies, proponents and communities. The protocol does not imply that all costs involved in its implementation must be borne by proponents. Since public health may both benefit and suffer from any proposal, agreement for sharing costs of an E&HIA should be negotiated on a case-by-case basis depending upon the nature of the health information required and its likely future use to the community. A more detailed discussion of options for resourcing E&HIA is presented m Chapter 2.

If E&HIA is to be effectively carried out, a number of issues raised by both expert and lay respondents will need to be addressed and resolved. These issues are discussed in this report and define the boundaries of the national framework for E&HIA, and its place in the context of environmental management.

1.2 International context

> Good health and well-being require a clean and harmonious environment in which physical, psychological, social and aesthetic factors are all given their due importance. (WHO 1989b)

The European Charter on Environment and Health (WHO 1990) sets out the responsibilities of countries, communities and individuals in reversing environmental degradation and promoting global, community and individual health:

Environmental impact assessment should give greater emphasis to health aspects. Individuals and communities directly affected by the quality of a specific environment should be consulted and involved in managing that environment.

The Charter has also identified global priority areas for environmental planners. These include:

- the impact on environment and health of
  - global ecological disturbances;
  - energy options;
  - transport;
  - agricultural practices;
  - persistent chemicals; and
  - biotechnology;
- urban development, planning and renewal;
- safe and adequate drinking water and hygienic waste disposal;
- water and air quality;
- microbiological and chemical safety of food;
- contingency and disaster planning and
- cleaner technology.

These principles and priorities provide the priority considerations for E&HIA.

The current international interest in E&HIA is both part of a broader review of EIA practice, and a response to changing perceptions of public health. EIA is currently undergoing evaluation and review in North America, where it has been in existence for about 20 years, and in Europe and Australia (eg UNCED 1991 (UNEP/MARC/WHO 1989a, Prytz 1991, O'Brien 1991, Hundloe 1990). The World Health Organization and the United Nations Environment and Development Programs have produced much of the general literature on E&HIA and environmental assessment (eg WHO 1985, WHO 1989a, WHO 1991b, UNCED 1991, World Conservation Union 1990, and other inter-governmental bodies eg OECD 1990).

Federal and State or provincial level governments, particularly in North America, have responded to public pressure for HIA and are beginning to legislate and investigate administrative procedures for the practice of HIA (eg Canadian Public Health Association 1990, Health and Welfare Canada 1989, NHMRC 1991a).

Canada's Green Plan (Canadian Government 1990) describes the importance of human health in every environmental issue and identifies for future consideration:

- drinking water safety;
- effects of air pollution on health;
- waste management and health;
- native people and environmental contaminants;

- registration of radiation hot spots with high incidences of cancer; and
- health and environment information and awareness.

In May 1982, WHO's involvement in environmental health impact assessment was sanctioned by the World Health Assembly. Resolution WHO/35.17 recommended that environmental health and health impact studies should be carried out and developed before the implementation of all **major** economic development projects. The resolution focused particularly on two areas:

- development projects for global water resources; and
- industry within the developed world, particularly hazardous industrial developments, toxic chemicals and the concomitant risk of **major** technological disasters.

WHO's approach to environmental health impact analysis has two main aims:

- to strengthen health and safety considerations in impact assessment; and
- to encourage member states to undertake such assessments for each **major** development project (Giroult 1988).

Emphasis has also been placed on the need for health agencies to study developments retrospectively as a means of assessing the scale of actual health impacts and the need for post-project monitoring and assessment in order to build up ***m*** epidemiological database to guide future EIAs (Go 1987).

Although most policies contain **an** implicit assumption that EIAs address human health, it is evident that practice falls short of this aim. **In** the United States, for example, while the legislative history and the policy statement of the *United States Natimd Environmental Policy Act* (the first Act to establish EIA, passed **m** 1969) assigns the highest priority to effects on human health and welfare, environmental impact statements in fact deal mainly with effects on natural system. A 1986 study by the WHO Regional Office for Europe reviewed 13 EIAs related to proposals for chemical industrial developments in various European countries. Analyses of the impacts on air and water quality were usually included, but there were no serious attempts to extend the analyses to evaluate potential impacts on human health and only one case devoted a section to public health. The WHO review concluded that the weight given to the evaluation of health effects in an EIA is largely determined by the perception of these issues by the EIA study team and the permitting authority. **A** United Nations Environment Program report concluded that the key to ensuring that health issues are addressed adequately is to involve health authorities in the 'scoping' process (Go 1987). (Scoping is discussed in Chapter **4.)**

An appropriate model for health authorities in EIA has been proposed by Go (1987, p. **31):**

> The role of health authorities in the EIA process is primarily one of review and advocacy. This can only be effectively discharged **when** health agencies actively participate in the planning process by articulating human health concerns and ensuring that the methodological procedures are adequate to capture significant projects and able to weight their health implications.

1.3 Philosophy underlying the proposed E&HIA framework

One of the principal aims of environmental and health impact assessment (E&HIA) is to engender explicit assessment of health and environmental effects which are unquantifiable, or are not covered by regulations. E&HIA methodology is therefore best considered as part of the overall planning process and not as a separate and discrete exercise (Go 1987). HIA must not, however, become merely a side issue m an EIA system that has already developed priorities and mechanisms. Rather, specific consideration of public health should become a major element and a central part of EIA (McMichael 1990).

The focus of E&HIA should be on the effects a proposal will have on humans (who presumably are the main recipients of the perceived benefits) as well as its effects on the physical and biological environment and the economy. The Resource Assessment Commission, in its submission on the draft protocol, suggested 'elevating human health impact assessments and social impact assessment to the same status as environmental impact assessment and economic impact assessment, rather than regarding them only as indirect effects to be examined within an environmental impact assessment'.

An integrated approach is necessary because impact assessment involves inherently social and economic as well as technical considerations. Decisions can rarely be made on the basis of scientific data alone. Even where data are sufficient, choices must involve judgements of relative benefit and cost, and acceptability of risk. The process involves negotiating acceptable approaches to development among stakeholders who may have conflicting needs and motivations. Inevitably the decisions taken and choices made are influenced by cultural and social values, as well as scientific data and economic analyses.

The philosophy underlying the proposed framework for health impact assessment reflects key principles of public health, as follows:

- Human health and the environment are interdependent.
- Most changes to local or global environments are likely over time to affect human health for good or ill.
- Human health is affected by social, psychological, economic, ecological and physical factors.
- Human health is a basic requirement for and imperative of ecologically sustainable development.
- Decision-makers have a responsibility to involve communities in decisions which affect the health and amenity of their environment.
- Social justice is a key consideration in public health policy and ecologically sustainable development.
- Decisions should err on the side of caution when impacts on health and the environment are not clearly understood.

Each of these points is discussed below.

Human health and environment are interdependent

Development proposals, policies and planning need to take account both of global initiatives (see above, section 1.2) and of the Australian National Health Goals and Targets. The September 1992 *Review and Revision of National Goals and Targets* (Nutbeam et al) has identified four main priority areas for public health:

- preventable mortality and morbidity;
- healthy lifestyles and risk factors;
- health literacy and life skills; and
- healthy environments.

In 'healthy environments', the focus is on the physical environment, transport, housing, homes and community infrastructure, work and the workplace, schools and health care settings. (Details of National Goals and Targets, including target groups and indicators, are available from the Commonwealth Department of Human Services and Health.) Adverse impacts of environment on health are generally greatest amongst those with fewer resources to modify environments to their benefit. Creating environments that support health is thus fundamental to achieving greater equity in health.

Significant health risks associated with the types of developments which require preparation of an EIA include:

- respiratory problems such as asthma;
- carcinogenic, mutagenic and teratogenic hazards and metabolic toxicity posed by substances in daily use;
- risks of death or injury arising from industrial and transport accidents, particularly those involving flammable or toxic agents; and
- the health effects of changing regional economies, or changing working and personal living standards.

More work is needed on identifying and evaluating indicators of community health to facilitate health impact assessment. All available data, based on public health surveillance linked with pollutants and epidemiological and geographic assessment of disease clusters, should be aggregated and made accessible at a national level for reference by proponents.

Most changes to local or global environments are likely, over time, to affect human health for good or ill

The relationship between localised environmental pollution and health (for instance the relationship between contaminated water and infectious disease) is obvious, and the study of environmental health — that is, of the relationship between environmental factors and the health status of groups and communities — has, in the past, been confined largely to such localised or single-agent problems.

The ecosystem disturbances recognised over recent years are of a different order m both scale and timeframe. The effects on health of disturbances such as regional air or water poilution, the depletion of stratospheric ozone, reduction and redistribution of cloudiness and precipitation, acid rain and 'greenhouse' warming — while they are less immediate and direct — will be ultimately more widespread (NHMRC 1992).

From this perspective E&HIA must examine ecosystem and the interactions which sustain or threaten them as well as individual project elements such as a single industry activity or pollutant. This requires the cooperation of a wide range of sectors and organisations, both governmental and non-governmental, and the formulation of policy which recognises shared responsibility to assess costs and benefits.

Human health is affected by social, psychological, economic, ecological and physical factors

Integrated environmental and health impact assessment is a form of primary prevention which attempts to predict health outcomes and introduce pre-emptive management strategies.

Traditional epidemiology and surveillance dominated models of public health focus on protecting people from infectious and biological hazards. Epidemiology, however, is a somewhat limited tool m impact assessment because of the heterogeneous nature of the population, the small size of populations affected, poor definition of actual population exposures, long latency periods which require sensitive and regular monitoring and reporting bias by populations concerned as a result of media coverage (McMichael 1989).

The traditional approach which includes occupational health and safety concerns must be complemented by social and environmental analysis and commumty involvement in these processes. Local and regional planning procedures should incorporate these aspects and provide an appropriate context for E&HIA of specific proposals.

Human health is a basic requirement for, and imperative of, ecologically sustainable development

Sustainable development entails the integration of economics and ecology to:

- manage population growth;
- reduce global pollution;
- preserve species diversity;
- recognise the link between poverty and environmental degradation;
- evaluate natural resources appropriately; and
- develop equitable international economic relationships.

In the developing world, ill-health, poor environmental conditions and poverty go hand in hand. Integrated approaches to E&HIA need to reflect key health objectives in areas such as food production, water supply and sanitation, industrial policy, and the planning of human settlements and industrial developments. The health

risks to vulnerable groups must be identified and socioeconomic factors which underlie these risks must be taken into account in development policy

Decision-makers have a responsibility to involve communities in decisions which affect the health and amenity of their environment

Community involvement is a tine qua non for E&HIA. If the principal objective of HIA is to maintain and improve the community's health, then the commumty must be the laboratory m which achievement of that objective is planned and measured. The mechanisms most suitable for consultation will depend on local needs and the scope of the proposed development.

Some value clashes are inevitable, given that the effects of a development or proposal may range across physical, biological, economic, human health, social, cultural, political, technical, institutional and legislative spheres. Economic values, for example, discount both benefits and costs progressively as they are deferred into the future, while biologists and health professionals, on the other hand, deem it unacceptable to trade off human health or a species' biological future m exchange for short-term benefits (Schoefield 1992).

The entire E&HIA process should be interwoven with community consultation, from the development of planning policies to the evaluation of project outcomes (NHMRC 1992). Often, however, public comment on proposals is not called for until the proposal is m its final stages and a draft EIS is posted (usually in a post office, library or council offices). By this stage the proponent has invested considerable money and energy in the proposal and is unlikely to want to change it, while the community perceives the proposal as a *fait accompli* and public comment as a futile exercise. In adversarial climate is created and disputes often end m the courts, to everybody's cost. In established pattern of mistrust and confrontation is not easily dispelled, and may even be in the interests of some individuals, groups and institutions. The damaging and costly nature of such conflict to all parties needs to be recognised; m particular, the conflict of interests in environmental issues which potentially confronts local government decision-makers must be recognised, and procedures established to assist m identifying local government planning priorities and mediating disputes.

The model proposed in this report owes much to the proactive process established by the Social Impacts Unit (SIU) in Western Australia. In the SIU approach, consultation begins before any formal EIA process has begun so that the community and the developers identify and solve problems together. The SIU facilitates interaction between developers and the local community, helping both sides to develop social contracts and to resolve issues through informed negotiation. It also includes an 'after care' component (similar to monitoring). The work of the SIU is paid for by the developers. (The process is described in a booklet produced by the SIU entitled Working with Communities: *A Guide for* Proponents.)

Victoria employs another approach which invites early consultation and involvement. For each Environmental Effects Statement (EES) the responsible minister appoints a consultative committee to guide the preparation of the EES so that it addresses key issues and treats them objectively. The committees provide a

forum at which parties with an interest in the proposal have an opportunity to exchange views and to contribute to the information provided to the public and decision-makers. The committees are chaired by an officer of the Environment Assessment Branch of the Department of Planning and Housing. Membership includes the proponent and his/her consultants, the planning authority, key agencies, and representatives of community and environmental groups. Committees have no decision-making role, but may report as necessary to the Minister for Planning and Housing.

Social justice is a key consideration in public health policy and ecologically sustainable development

Creating healthy environments is basic to achieving equity in health. Very often the problems of environmental stress have the greatest effect on those with least economic and social power. For example, use of chemicals in the workplace may be more stringently regulated than chemicals in the home where a large but under-represented population of women and children is exposed to unassessed risk. Social policy choices involve trade-offs between such factors as pollution costs and employment in expanding industries, or resource conservation and current consumption.

Equity in access to social resources and protection from environmental hazards is a central concern for public health and requires that communities have an adequate voice in decisions which will affect their health and well-being in the long term as well as the short term.

Decisions should err on the side of caution when impacts on health and the environment are not clearly understood

Disruption to global ecosystems poses threats which are complex, uncertain and potentially irreversible. Assessing the health risk in relation to such disruption is also complex, and the scientific basis for such risk assessment is still in the early stages of development. Decisions which potentially affect health must, therefore, err on the side of caution.

Uncertainty pervades environmental management and the complexity of the links between environment and health and the requirements of community involvement dictate that planning decisions can no longer be the sole province of 'experts'. Often there are only limited scientific answers to the complex problems which human settlements generate and a 'good scientific analysis' is no longer sufficient to allay public concern. Decisions are based on perceptions and values as well as scientific data. These features are the source of much of the difficulty surrounding intersectoral and community consultation in health impact assessment. Every Australian State and Territory can provide case studies which illustrate the complexities of negotiating among parties who have different perceptions of risk or utility in relation to a proposed development. Some progress towards integrating scientific data and social considerations has been made in the occupational health and safety sphere, but much remains to be done in applying the approach in E&HIA.

1.4 Conclusion

The overriding principle in developing E&HIA is that HIA should not be a parallel process but rather an integral part of the EIA process. This will be most effectively brought about by:

- established policy frameworks aimed at ecologically sustainable development and public health protection;
- legislation which requires health impacts to be addressed explicitly m EIAs;
- development of guidelines to assist proponents and assessing agencies to identify and address appropriate areas of health impact;
- development of formalised avenues for access to health expertise and community input at all stages in the EIA process; and
- clarification of the roles both between levels of government and of the various government agencies.

Effective public health interventions go beyond the direct actions customarily mandated to health and environmental management authorities (WHO 1991c) and increasingly involve people outside health agencies. Health authorities should nevertheless remain active in environmental health since they can provide health-related technical guidance and can assess health problems and their environmental determinants. Health authorities must also play an important role m implementing policy to reduce adverse environmental impacts and in communicating health information to developers and decision-makers (WHO 1991a, WHO 1991c).

Public policy based on the principles of ecological sustainability is the key to reconciling development with the health of both the environment and the human population. If an environmental perspective is adopted from the outset of planning, then political and public priorities will be known and can be addressed in development proposals.

Even within the context of ecologically sustainable public policies new ways of surmounting traditional sectoral barriers will be needed to enable strong professional connections to bridge the gap between environmental dvelopment and health agencies and to ensure that viable access points are available for communities to participate in the E&HIA process. Health professionals must seek a more clearly defined approach to health input through:

- establishing more effective communication channels;
- helping to define more specific linkages between environment and human health;
- promulgating guidelines, standards and codes of practice linked to health effects; and
- establishing improved databases and methodologies for health risk assessment.

Some key issues related to resourcing of E&HIA will also need to be satisfactorily resolved before the process can be incorporated successfully into existing procedures. Resourcing is discussed in the next chapter.

2 Resourcing Environmental and Health Impact Assessment

2.1 Introduction

Potential proponents and industry groups have expressed concern over any addition to existing EIA procedures which might increase costs and therefore jeopardise the economic viability of proposals. They argue that most development carries benefits for communities and that aggregation of data concerning public health is the concern of governments. Opponents of this view argue that legitimate costs of protecting public health should be built into the costs of projects. Both viewpoints are valid and the responsibility for resourcing E&HIA cannot simply be assigned to proponents. In the first instance, much of the required data on population health is available in aggregate form from health agencies. If such data are not already available but need to be collected, those data are likely to be valuable for other aspects of public health surveillance beyond the immediate needs of the E&HIA in question, and cost sharing with public health authorities is appropriate.

It is also evident that, if many aspects of the proposed protocol are followed, costs could be open-ended unless safeguards and clear limits are imposed from the outset. These safeguards should be specified for each proposal at the scoping stage (see Chapter **4).**

The remainder of this brief chapter suggests options for resourcing both direct and indirect costs of E&HIA. It emphasises that significant new resources may not be needed, and that many of the problems which arise in the implementation of E&HIA could be addressed by re-orientation and more effective utilisation of existing public health resources and more closely targeted data presentation in EIAs.

There is no question that lack of expertise for conducting the type of E&HIA recommended is a major problem. Insufficient scientific, epidemiological, behavioural and toxicological knowledge will continue for some time to limit the effectiveness of our best efforts. Nevertheless, it is necessary to strive towards a better understanding of the interactions between environment and health. Investigations done as a basis for E&HIA, if aggregated, should contribute towards that better understanding and common stock of knowledge. In the medium to longer term, the existence and maintenance of public and environmental health databases and monitoring systems will reduce the costs of E&HIA to both proponents and communities.

2.2 Direct costs

Proponents of developments, be they government or private, generally bear the costs associated with **EIA** and, increasingly, with environmental audit. HIA is a legitimate component of **EIA** and thus should be incorporated mto its cost structure. The open-ended nature of health impact assessment requires that clear boundaries of proponent responsibility be identified at the outset so that the certainty and efficiency of the process are guaranteed as stated m Schedule **3** of the **IGAE.**

Safeguards will be needed to protect both the public and proponents from misuse of the legal system and its costly implications. Early collaborative planning by proponents in consultation with scoping teams is recommended to forestall later disagreement and expensive legal challenge. Similarly it is not reasonable to expect proponents to pay for investigation of health criteria which are not directly affected by their project. Extensive use should be made of existing data and data generated by public health research and health authorities. The extent of the need to collect new data for the E&HIA and responsibility for cost-sharing should be clearly identified as a part of the scoping exercise (see Chapter 4.2).

23 Resource options for auditing and monitoring

While proponents increasingly bear the cost of environmental audit, it is less straightforward to assign financial responsibility for health monitoring or audit.

It is possible through site-specific monitoring to attribute a particular pollution event to a specific polluter. It is generally not possible — with the exception of acute or catastrophic events such as Seveso, Bhopal or Chemoby — to attribute health effects to specific incidents or developments. The effects of chronic exposure are often insidious and invisible for some time and the long latency periods combined with population dispersal prevent cause-and-effect links being established. The health of populations, especially in urban areas, is the net result of a multitude of environmental and personal factors, and at most, it can be asserted that a given development may be a contributor to those factors. Any development may simultaneously have both positive and negative effects on health: it my, for instance, degrade air quality but improve employment prospects and socioeconomic well-being which are known correlates of good health.

Decisions about resourcing of health monitoring need to be project-specific. Where known health risks of contamination can be measured by known monitoring methods, it may be appropriate to incorporate financial responsibility for that monitoring into a development consent. A lead smelter, for example, could be required to finance periodic surveys of soil-lead contamination and child blood-lead levels within its impact zone.

More commonly a project is simply adding to the potential environmental health burden of a community. In these circumstances, monitoring the health of that community should be the responsibility of local and regional health authorities and could be financed by some combination of costs levied on proponents, consumers, communities and governments, along with economic instruments such as development application fees, licensing fees, or environmental health development levies which provide incentives for proponents to maintain healthy environments. In the past such levies have been aimed at cleaning up existing pollution and environmental damage. A significant shift in perspective would be needed to permit their application to the health sector. The resource implications of regional public health monitoring are beyond the brief of this document. Such decisions must be debated and determined by State and Federal policy-makers.

In addition to raising revenue, ways must be sought to use existing resources more effectively and efficiently in environmental health monitoring.

2.4 Indirect costs

Indirect resource requirements may be more difficult to satisfy, since they derive from the inadequacy of the public infrastructure and human resource base in environmental health. Three approaches will be needed:

- redeployment of existing resources;
- education and training and
- expansion of the knowledge and methodology base through research and development.

2.4.1 Redeployment of existing resources

Some progress towards implementing E&HIA could be made by more effectively organising the resources which currently exist. Local authorities, including local government and regional health units, could collect much of the baseline data as part of their routine public health and regional planning roles if they had access to technical advice and coordinated information on statewide issues. Existing expertise in health agencies needs to be supported by readily accessible networks in biology, toxicology, water resources, geology, entomology etc.

Environmental health monitoring could be carried out under the auspices of a number of programs and agencies. Projects such as Healthy Cities (Townson 1991) and the Healthy Localities and Municipal Public Health Plans in Victoria have proclaimed the link between health and healthy environments. Most State and regional health authorities and local municipalities expend considerable sums on health promotion units and community development agencies. These groups could, if made more aware of the issues, direct their efforts profitably towards community development aimed at environmental protection and public education for participation in environmental health planning and monitoring activities. A model

for such activities can be found in the Victorian Municipal Conservation Strategies, m which local conservation officers effectively stimulate commumty participation m conservation at the local level. Similar strategies could be adopted for public health planning and surveillance.

Mechanisms are needed to resource, inform and empower community participants. Existing networks m community health and welfare, ethnic services groups, school councils, local conservation officers and health promotion officers could all be oriented towards an environmental health perspective in their commumty development work.

2.4.2 Education and training

It is beyond the brief of this consultancy to define the size and skills of the workforce needed to implement E&HIA. Workforce planning should, however, be a major plank in the platform for implementation of the protocol.

A large number of professional groups is involved currently m environmental science and environmental impact assessment; and a growing and multi-disciplinary workforce in public health is also emerging in Australia. Relatively few of these people, however, have expertise in environmental health or policy In local government, environmental health officers (formerly public health inspectors) and those involved in planning departments represent a large environmental health workforce. Each of these groups requires training or retraining to perform the functions which are identified in the proposed framework.

To meet the wide range of needs represented by these groups, a variety of flexible modular program will be required ranging from informal short-course or distance education packages to formal undergraduate and higher degree qualifications.

2.4.3 Development of the knowledge and methodology base

Areas of priority for research and development should be related to the National Health Goals and Targets for Environmental Health. In particular, considerably more emphasis is needed on identifying and measuring indicators of community health. In the meantime, available data based on public health surveillance linked with pollution incidence, and epidemiological and geographic assessment of disease clusters should be aggregated and made accessible in a national environmental health database.

Further research and development is needed in a number of areas. Methods need to be developed or improved to:

- define and measure relevant desired public health outcomes;
- monitor regional pollution;
- acknowledge community perceptions of risk in the decision-making process;
- ensure effective community participation in planning and decision-making for development;
- assess risk, particularly for the newer industrial developments and chemicals where practical experience is limited; and
- provide guidelines for measuring and evaluating exposure.

Databases need to be developed which document:

- core methodologies for baseline studies, with all aspects for a particular type of development, including legislation; and
- qualitative information to identify potential impacts from specified activities.

Research is needed into:

- the effects of indoor air quality and climate, (particularly m multi-family high-rise buildings), on disease transmission and general health;
- the differential effects of environmental health factors on high-risk groups, and how such knowledge may be incorporated into E&HIA; and
- the impact on health of more general societal changes arising from urban development including such impacts from the effects of urban layout including density.

Other needs include:

- further epidemiological and toxicological studies on the effects of pollutants on human health, particularly the synergistic effects of a number of pollutants;
- guidelines for conducting risk analyses; objectives, procedures, and methods for dealing with uncertainties are especially needed; and
- better health indices to measure non-fatal, sub-clinical and social health outcomes.

2.5 Conclusion

E&HIA should not impose an undue burden on proponents. It should be integrated within existing processes and supported to the fullest possible extent by existing data on population health status and risk assessment. While it is reasonable to expect a proponent to provide full information about health risks directly attributable to the development in question, the more complex issue of regional or catchment area assessment for population health purposes must be the responsibility of the authorities charged with the protection of the health of the public.

Successful implementation of E&HIA will require a partnership in which proponents, communities and appropriate public authorities cooperate to provide the information necessary to make a reasonable assessment of public health risk, and to provide public health surveillance in identified priority areas. Resources will be needed to assist communities to take a full role in the partnership. Methods for resourcing community participation should be explored at State and local levels.

Options which have merit are

- application of a designated percentage of the total EIA cost to financing public participation and support; and
- incorporation of the E&HIA agenda into existing public authority and local government community development programs.

It must be emphasised that many of the responsibilities inherent in HIA are public health responsibilities which should be implemented and resourced by the authorities charged with maintaining the health of the population. Development of project proposals, E&HIA and project after-care all intersect with that responsibility. The proposed protocol for **HIA** does *not* shift the burden of public health mamtenance to proponents. Rather, it aims to highlight the fact that more cost-effective planning, sharing, collating and monitoring of data on health outcomes will result if proponents and health agencies work together with common goals for public health and the advancement of knowledge in E&HIA.

RESCINDED

3 Australian experience: the existing administrative and legislative context for E&HIA

3.1 Introduction

The effectiveness of E&HIA is constrained by the effectiveness of the broader processes for project approval, land-use planning and public health surveillance, of which it forms a part. The regulatory frameworks governing EIA and HIA, and their practice in the Commonwealth, States and Territories of Australia, are complex, lack uniformity in both content and administrative structure and are rapidly evolving. The summary in this chapter was correct in early 1993. In some States, Environmental Impact Statement (EIS) legislation explicitly requires elements of HIA; in others, this requirement is only implied. Responsibilities and decision-making are divided between local, State and Commonwealth bodies, and a somewhat narrow view is taken of the effects of proposed developments on health. The failure to develop methods for momtoring the public health impacts of projects in the implementation stage has also inhibited an intersectoral approach.

The link between environment and health is not addressed consistently in Australian legislation. One-hundred-and-thirty Environmental Impact Statements and Public Environment Reports (PERs) have been lodged in Australia since 1975 under the Commonwealth's *Impact of Proposals Act*, most on developments which carry potential risks to public and occupational health through water contamination, air pollution, noise, radiation, and/or psychological impact. Yet the data presented in those EISs and PERs most frequently address workforce exposures, point-source emissions and ambient levels in the proximity of the development, without specific reference to effects on human health (Odgers 1990).

A number of respondents in the initial consultations for this project expressed concern that health impacts are dealt with piecemeal under several pieces of legislation (although others commented that existing legislation was adequate) and may not be given a 'determining weight' in the assessment of proposals. If there is no requirement that the assessing authority seek health input, then health agencies may be involved only towards the end of the process after the draft environmental impact statement is released, or not at all. In some cases, the degree of consultation appears to hinge on the personal relationships developed by staff in environmental agencies with their counterparts in health agencies. When crossdepartmental consultation does occur, most States reported difficulties in the process stemming

partly from lack of resources to meet the demands for information (particularly m Health Departments), but also largely from the differences which exist between the professional cultures within environmental agencies and health agencies. The different attitudes and policies of health agencies and environment agencies may even lead them to adopt different standards which focus on their perceived responsibilities. Health staff commonly complained that the public and some other government agencies expect quick and simple answers to problems which can be solved only by large-scale investigation, if at all.

Government agencies are wary of community perceptions of risk and of media sensationalism. They are understandably cautious in providing any information which is not known to be 'scientifically accurate'. This caution may be interpreted by others as unnecessary reluctance to venture opinions in the face of uncertainty.

Clearly these basic problems will need to be addressed if a national framework for HIA is to be implemented.

Systematic monitoring of health and health-related outcomes of developments in Australia will help in the long term to resolve this difficulty. Many traditional impact assessment practices will be difficult to implement' with respect to human health. For example, monitoring to detect health effects post-development will be complex because of the lag time before health effects develop, and the mobility of populations. Individual proponents of developments cannot reasonably be expected to monitor communities that are subject to the effects of multiple developments and whose composition is continually changing. The most effective protection of human health will be through broader social planning and monitoring, with individual projects being required to comply with an established policy framework (RAC 1992).

Despite the differences between the various governments in Australia **m** regard to HIA m EIA, there are some common problems including:

- the inadequacy of current mechanisms for collaboration across sectors, agencies or departments (planning, health, environment);
- the lack of information (or access to appropriate expertise) and/or suitable methodologies to assess health risks;
- the difficulty of ensuring adequate and representative community involvement;
- the need to identify appropriate roles for local government in environmental health;
- the lack of adequate methods for dealing with cumulative and synergistic impacts on health; and
- the need for post-implementation monitoring and post-closure of projects, with the dual aims of evaluating the impacty assessment and documenting outcomes to improve subsequent risk assessments.

For extensive reviews of current Australian practice, see O'Brien (1991) and Odgers (1990).

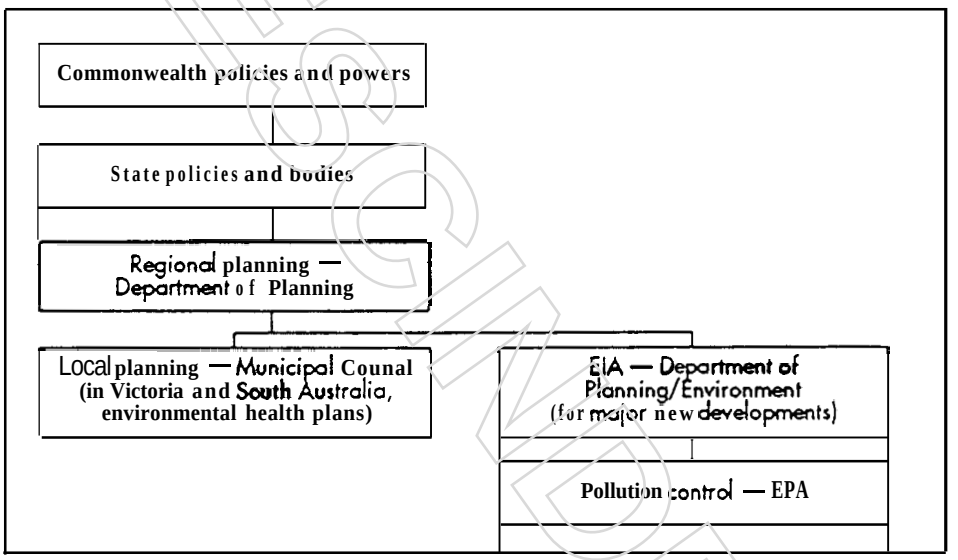
UNCORRECTED

3.2 Administrative context of E&HIA in Australia

3.2.1 Existing administrative structure

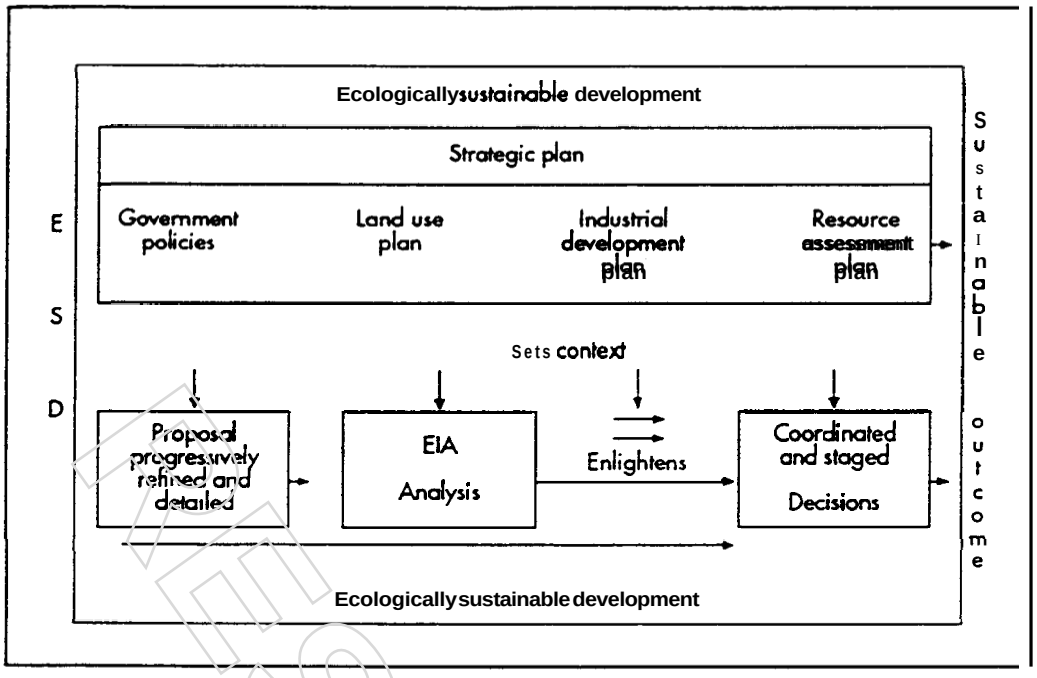
Figure **3.1** summarises the present jurisdictions for HIA and EIA in Australia, and Figure **3.2** describes the context within which EIA should occur. The EIA process currently fits within the overall planning process and deals **very** largely with new development proposals of considerable scale and significance. The formal EIA process sits within the broad policy and planning procedures and its effectiveness depends to a significant extent on these policies and plans. Health issues need to be considered for the overall framework set out in Figure 3.2 as well as for EIA specifically, and while such consideration is outside the scope of this report, the principles and priorities recommended for E&HIA are also applicable at the strategic planning level.

Figure 3.1 Summary of present EIA jurisdiction



REVISED

Figure 3.2 Setting the context for Environmental Impact Assessment (from ANZECC 1991)



The present administrative context for EIA has several limitations. In particular:

- For many proposals, decisions may be made by local government or other authorities without any formal requirement to consider environmental impact or the cumulative effects of small changes (these changes are covered by the categories 'local planning' and 'pollution control' in Figure **3.1,** and by 'decisions' in the lower right-hand box in Figure 3.2).
- The EIA process is not usually required either to consider the cumulative effects of proposals on a region or to provide for ongoing monitoring of impacts.
- Uncertainties about responsibility or conflicting responsibilities in any significant environmental issue frequently arise as a result of the wide range of existing State **and** Commonwealth legislation which can impinge on environmental health issues.
- Some procedures for EIA remain contentious. The question of whether the EIS should be prepared by the proponent or an independent body is debated in government discussion papers, by community groups and professional journals.

Australia's planning framework arose in response to rapid and uncontrolled urbanisation early in the 20th century, and followed patterns established in Europe and the USA (Woodhead 1990). Australian legislation was reviewed when the environment became a focus of political concern during the 1970s, and Environmental Impact Statements (EIS) were introduced for presenting project details in development applications. Woodhead claims that Australian initiatives simply followed international patterns with little effort being made to assess their appropriateness to the Australian context.

States, Territories and the Commonwealth have separate pieces of legislation which, though they have basically the same objectives, specify different procedures and have differentscope. This problem is being addressed by the Australian and New Zealand Environment and Conservation Council's (ANZECC)national approach to EIA.

The 1992 Inter-Governmental Agreement on the Environment, while identifying and addressing a number of problems does not resolve many of the difficulties in the Australian system described by (Buckley 1990b):

- inconsistencies between States' approaches to EIA;
- constitutional limitations on Commonwealth powers concerning resource management and development;
- intervention in EIA by the political process;
- inadequate integration of environmental planning, environmental management and pollution control;
- inadequate mechanisms for enforcing environmental regulations;
- poor mechanisms for incorporating new scientific developments into EIS;
- inadequate auditing and testing of predicted impacts;
- lack of accessible data bases on previous impact predictions;
- limited formal involvement of the public;
- inadequate frameworks for regional environmental planning;
- an inadequate framework for environmental planning and management m overseas trade and aid;
- inadequate frameworks for integrating economic with non-economic considerations in development planning; and
- difficulty in measuring morbidity, and sub-clinical, social and cultural outcomes, particularly for local communities.

The proposed framework for E&HIA addresses some of these problems. Basic changes in the infrastructure for environment and planning, legislation and administration are beyond its scope and must be addressed as part of the National Strategy for Ecologically Sustainable Development. The proposed introduction of complementary Commonwealth and State legislation within the National Environment Protection Agency may also resolve some but by no means all of these issues.

Existing procedures for conflict resolution are also widely recognised as unsatisfactory. The most common procedure is litigation in the courts which is costly time-consuming and inherently adversarial. Alternative methods for resolving disputes are increasingly sought. These include (Trainor and Klug 1991):

- multi-facetednegotiation, where parties seek to resolve differences without a third party intervening;
- mediation, where an independent person facilitates discussion but does not impose a solution;

- mini-trials, where a neutral panel assesses the strengths and weaknesses of each case; and
- use of independent experts who can advise on technical aspects.

3.2.2 Health Impact Assessment within the existing EIA process

Environmental health considerations in Australia are the responsibility of health agencies. The environmental and planning departments responsible for EIA do not have health professionals on staff, although some routinely consult health departments if a proposal appears to have health implications. The limitations of this approach are obvious, in that the potential for health impact may not be recognised and as a consequence the proposal may not be referred to health experts.

Many environmental and public health issues began as, and continue to be, the responsibility of local government. In view of the important role of local government in land-use planning and risk minimisation, its influence on environmental health issues is significant. This is recognised in Victoria and South Australia, where legislation requires both local councils and State departments to be involved in preparing environmental health plans. In other States, the departments of health have addressed the issues via specialist units such as the Public Health Units in New South Wales (Rubin et al 1990).

3.3 Legislative context

3.3.1 Current legislative procedures for EIA in Australia

A detailed account of EIA procedures in Australia is provided by O'Brien (1991). Earlier accounts can be found in Gilpin (1980) and Porter (1985).

The Australian Constitution allocates responsibility for most development, planning and resource issues to the States, and hence most EIA is carried out under State legislation. Commonwealth involvement in EIA is defined by the *Environment Protection (Impact of Proposals) Act 1974* and is largely limited to Commonwealth agency activities.

The High Court challenge over Commonwealth intervention in the Franklin Dam decision in the early 1980s highlighted the problems inherent in division of responsibility and the need for cooperation between the States and Territories and the Commonwealth. The establishment of cooperative management and decision-making between the States, Territories and the Commonwealth via Ministerial Councils or bodies such as the Great Barrier Reef Marine Park Authority established in 1975, has become more important as inter-regional issues become more common.

The *1974 Enuironment Protection Act* was substantially amended in 1987 and now allows for EIA by Public Environment Reports (PER) as well as Environmental Impact Statements and Commissions of Inquiry. These procedures all involve consultation between the proponent and the administering department (presently DASET) — that is, a 'scoping' procedure (see Chapter 4.2) — and a later

involvement by the community, with public review of the PER or EIS. State and Territory legislation for EIA generally allows for similar procedures, particularly in New South Wales, Victoria and South Australia where EIA is part of the planning process. In Western Australia and Tasmania, EIA is more aligned with pollution licensing arrangements.

3.3.2 Australian legislative practice and responsibilities in relation to health in EIA

In general environmental policy legislation in Australia in relation to health issues has not adopted policies and protocols adopted by the World Health Organization and other national legislatures. The Acts controlling air and water pollution have been concerned largely with control and licensing of industry emissions, and monitoring of environmental pollution has concentrated on assessing industry compliance at source through regulation of adopted standards rather than providing information and evaluation about levels in areas away from known major industrial sources (Young et al 1988). The policies and legislation in each State and Territory differ in their definitions of the type of developments which should be subjected to EIA. In many cases information about regional environmental quality is not available. This is increasingly a cause for concern as the connection in the public's mind between 'quality of life' and 'public health' becomes stronger, and pressure is exerted on pollution control bodies to provide information. Public awareness is increasing the extent to which health considerations are included in impact assessments (Auer 1989); however development of policies and legislation is cautious because of the uncertainties involved in defining and evaluating key concepts such as 'health' and 'risk', particularly in economic terms.

Pollution control legislation has been driven largely by health considerations, and the establishment of environmental protection authorities or agencies is part of the move towards strengthening and coordinating all aspects of pollution control.

In New South Wales, *the Clean Air Act (1961)* was initially administered by the State's Department of Health, as was the *Queensland Clean Air Act* as late as 1986. Clean Air Acts in most States are now under a central body such as a State EPA, although in Queensland the Department of Environment and Heritage is responsible for the Clean Air Act. In New South Wales, the EPA also administers the *Clean Waters Act (1970)*, the *Noise Control Act (1976)* and the *Environmentally Hazardous Chemicals Act (1985)*. Health issues are addressed specifically in more restricted Commonwealth and State/Territory legislation such as that relating to occupational health and safety and to noxious or hazardous materials.

The *Federal Environment Protection (Nuclear Codes) Act (1978)* provides for 'protecting the health and safety of the people of Australia and the environment from possible effects associated with nuclear activities in Australia'; and most States and Territories have specific legislation controlling aerial spraying of agricultural chemicals, noxious trades, waste management and hazardous substances. Some of these are administered by departments of health and others by a pollution control or environmental planning body. They do not provide for a broad-based assessment of health and environmental issues.

The Victorian guidelines for EIA currently state that proposals which may need an EIA are those 'which could affect areas of high conservation value, including alpine areas, wetlands, coastlands, estuaries, unique flora and fauna communities—those containing uncommon or protected species'. Health is not specifically acknowledged.

The Commonwealth's *Enuironmental Protection (Impact of Proposals) Act (1974)* and the New South Wales *Enmronmental Planning and Assessment Act (1979)*, under which environmental impact assessments are carried out, define 'environment' broadly m a way which could incorporate health aspects: 'all aspects of the surroundings of m m whether affecting him as an individual or in his social groupings'. Human health is clearly one such aspect, although until recently it has rarely been considered in depth in public enquiries and EIAs.

'Guidelines for Identification of Environmental Significance' (CEPA, unpublished and reproduced m Appendix 5) have been developed to assist in determining whether a proposal affects the environment to a significant extent and consequently falls within the ambit of the Commonwealth *Enuironment Protection (Impact of Proposals) Act* 1974. The guidelines are intended to be used primarily in conjunction with Memoranda of Understanding (MOUs) agreed between Commonwealth environment and other authorities. The guidelines specify a number of criteria which should be considered in judging the environmental significance of a proposal. They are indicative and descriptive, rather than definitive, and no attempt has been made to weight the individual criteria, which relate to:

- the physical environment (natural physical, biological and political factors);
- the social environment (socioeconomic factors, community agencies, heritage agencies and environmental reservations);
- noise and visual aspects; and
- health and safety.

The list is not exhaustive, nor will all the factors listed be applicable to all proposals. If, following examination of a proposal against these criteria, the environmental effects are considered potentially significant, then the agreed arrangements for consultation and collaboration are applicable. To the extent that they incorporate health concerns, they provide a mandate for HIA in EIA.

Existing arrangements for EIA and E&HIA in the Commonwealth and in each State/Territory are summarised in the sections that follow. Illustrations of good practice in various States are also included. In particular, four developments offer promise and are, in some form, incorporated into the proposed national framework for HIA:

- the Social Impacts Unit in Western Australia;
- the SEQ 2000 project in Queensland;
- Municipal Public Health Plans in Victoria; and
- Environmental Health Management Plans in South Australia.

Some developments, on the other hand, appear actually or potentially to impede the progress of integrating EIA and HIA. These include the administrative separation of the social and economic impact assessment from the EIA process in Tasmania and aspects of legislation which have resulted m adversarial backlog in the court system in some states and territories.

Commonwealth legislation

Environmental Impact Assessment is the administrative responsibility of the Commonwealth Environmental Protection Agency (CEPA).

CEPA has responsibility for administration of the Commonwealth's *Environment Protection (Impact Proposals) Act* 2974. This Act, together with its Administrative Procedures, establishes the Commonwealth's environmental impact assessment process which is designed to ensure that all environmentally significant considerations are taken into account in Commonwealth developmental activities.

For industry, the *Impact of Proposals Act* will generally apply to:

- proposals which require Commonwealth approval to export products such as fissionable material;
- minerals sands, bauxite, alumina, natural gas;
- unprocessed wood products;
- proposals requiring foreign investment approval; and
- real estate development and tourist development.

New South Wales legislation

Environmental impact assessment in New South Wales is carried out under the *Environment Planning and Assessment Act (EPAA* 1979) administered by the Department of Planning. The Act provides for a tiered planning structure. State Environment Planning Policies establish policy on issues of statewide significance, such as urban consolidation. Regional Environmental Plans are the responsibility of the Department of Planning, while Local Environmental Plans are prepared by municipal councils. The responsibility for determining development proposals lies largely with local councils, but the Act provides for the Minister to determine proposals in some cases. This has occurred in matters deemed by the Minister to be of statewide significance, such as major coal developments. Pollution control functions are the responsibility of the EPA which deals with some issues directly related to health — particularly the avoidance of transfer of pollutants across environmental media — and the reduction of the total waste and pollution burden on the environment.

The *EPAA Act* uses a broad definition of 'environment' which can readily incorporate under the pollution control regulations consideration of health; however in practice it is not common for an EIS in New South Wales to include a specific section on health. In principle, Section 90 of the Act (which is roughly equivalent to section **313** of the *Local Government Act)* does not specifically exclude health assessment, however there are significant problems both structurally and administratively in ensuring that health is given equal weighting in the E&HIA

process. The fact that EIA is still undertaken predominantly by planners under the EPAA does not foster *m* integrated multi-disciplinary and multi-sectoral approach. h addition, EIAs assess impacts at the pollution source rather than the impact on the general environment and its cumulative effect.

Health arose as a significant issue during the assessment process for the Float Glass plant constructed by Pilkington ACI Operations Pty Ltd at Ingleburn. The Director of the Department of Planning required that the EIS, prepared in 1986, include assessment of 'economic and social significance' of environmental impacts such as 'potential for air pollution' of 'cumulative exposure to NOx and SOx emissions relative to tie stability of the Campbelltown air basin' and of the hazards associated with use of hydrogen and natural gas (Dames and Moore 1986). By March 1987, when the Department of Environment and Planning produced its Primary Submission to the Commission of Inquiry into the proposal, the issues considered 'significant' included 'impact on health' because of press coverage of local concerns. The residents claimed that respiratory diseases already had a high local incidence and the air emissions would worsen this situation. Commissioner Simpson concluded that the residents' fears were not well founded and recommended that the proposal be approved. Although the medical evidence presented to the Commission of Inquiry suggested that the incidence of respiratory disease was not unusually high the case raised general community awareness of possible health effects of air pollution. The case illustrates how community health concerns can be reflected in consideration of an EIS, which can then further increase community awareness of the issue.

Air pollution in New South Wales continues to be a contentious issue. After a severe pollution episode on 5-8 May 1991 caused by a combination of climatic inversion and smoke from controlled burning for bushfire management **m** the Blue Mountains, newspapers reported strong community concern over links between pollution and asthma incidence. Hospital admission data provided 'weak support for a link' between the episode and asthma admissions to five hospitals *(New South Wales Public Health Bulletin* 1991). An Air Quality Summit was called by the New South Wales Government and there have since been Summits in Newcastle and Wollongong as well as a second Summit in Sydney in February 1992. In response to concern and to facilitate urban development planning, the air quality monitoring networks in Sydney, Wollongong and Newcastle are being expanded. This approach to catchment management rather than industry-specific emissions will be further developed by the EPA.

Victorian legislation

EIA in Victoria is the responsibility of the Department of Planning and Development and the Minister for Planning, who administer the *Enuironmental Effects Acf (1978).* This Act is accompanied by EIA guidelines, and it requires an Environmental Effects Statement to include social impacts. In practice, however, environmental effects statements are required largely for land-use developments and public works. Pollution control and works approvals occur under a different Act, the *Environment Profection Act 7970* which is administered by the EPA. The EPA

reports to the Minister for Conservation and Environment. The Department of Health and Community Services has the power to veto works approvals if they endanger public health.

Each Victorian municipal council is required to prepare a municipal public health plan in consultation with the Health Department and annual review is required. These plans provide a link at the State and local levels with respect to public health issues.

There is separate provision outside the EIA procedures for Health Impact Statements under the *Health (General Amendment) Act (1988)*. This HIS legislation has not been proclaimed. There has been agreement between Health and Planning Ministers that health assessment for new developments covered by the EES process will be initiated as part of that process.

Health assessments are currently occurring with respect to EESs relating to the Southern and Western by-pass proposals (see Appendix 2) as well as the proposed chemical storage facility at West Point Wilson.

The final report of the Victorian Government's Powerline Review Panel, released in July 1989, discussed the health aspects of the dispute over the Brunswick to Richmond powerline proposal. It commented that the debate was marked by highly polarised positions, lack of shared information, and the adversarial use of competing scientific evidence. The safe level for exposure to electromagnetic fields generated by powerlines could not be agreed upon; the level advocated by the Powerline Action Group (an umbrella group of local councils and resident action groups) was far lower than the level advocated by the State Electricity Commission of Victoria (SECV). The fact that the level advocated by the SECV was the same as that proposed by the International Commission for Radiation Protection and the ILO/UNEP/WHO jointly sponsored International Programme on Chemical Safety did not persuade the community of its validity The crucial question was: what, m economic, social and political terms, can be deemed an acceptable level of risk and hence how cautious should government be? The dispute raised questions about the assessment of scientific data and it pointed to the need to establish formal administrative links between government departments in order to deal with health-related environmental issues (Edmonds 1989). A case study of the Brunswick to Richmond Powerline is also incorporated in Appendix 2.

Queensland legislation

EIA in Queensland is decentralised and responsibility for dealing with it is specified by the *State Development and Public Works Organisation Act (1971)*, the *Local Government Act (1936)*, and the *Local Government (Planning and Environment) Act (1990)*. In addition EIAs can be triggered by other statutes, for example, by the *Clean Waters and Clean Air Act* which is the responsibility of the Department of Environment and Heritage (DEH). The Department of Health must be consulted on any proposal which is likely to produce waste for land disposal, interfere with human use of water or with food production, generate demand for health services, or 'interfere with the physical, social and mental well-being of the adjacent or intended population'.

Issues which are appropriate to health impact assessment are considered through the EIA process. The scope of the EIS is broadly defined and includes social impact assessment, which is carried out by the Department of Family Services and Aboriginal and Island Affairs. Under this single integrated procedure HIA is a routine part of EIA.

The health issue of contaminated land is generally referred to the Health Department which is also contributing to its assessment at the national level (Langley and Saadi 1991). The contaminated land at Kingston in Queensland became a sensitive major social, health, and political issue, with people relocated and counselling services established. The Chemical Hazards and Emergency Management Unit was set up under the control of the Bureau of Emergency Services to prepare contaminated land legislation. Responsibility for the *Confaminafed Land Act* now resides with the Department of Environment and Heritage. To prevent further inappropriate uses of contaminated land, the *Local Government Act* enables local governments to request a report on my land where there is a request to rezone the land. All contaminated land can be covered by this legislation, except for radioactive wastes which are under the control of the State Department of Health and mine sites which are under control of the Department of Minerals and Energy. (The treatment of land used to store radioactive waste can be brought into the EIA process.)

Western Australian legislation

In Western Australia all decisions about proposed developments are made by portfolio Ministers in direct consultation with the Minister for Environment (Carbon 1991). The Environmental Protection Authority can require environmental assessment before a decision is made on any environmentally significant proposal. The provision of the Western Australian *Environmental Protection Act* requires that interested government agencies be consulted when a proposal impacts on their area of responsibility; the Health Department, for instance, is contacted for comments regarding occupational, health, safety and welfare issues relating to specific development proposals. The *Environmental Protection Act* is currently subject to review. It has been suggested that the scope of the Act should be broadened to include social and economic as well as environmental impacts. In some cases, developments which do not have impacts other than direct emissions are not subject to EIA but are licensed under the pollution control provision of the *Enmronmental Protection Act;* for example, country waste-water treatment plants.

The WA Advisory Committee on Hazardous Substances (WAACHS) coordinates the management of hazardous wastes for all State departments and instrumentalities, including health, with the aim of achieving coordinated inter-agency cooperation.

EIA in Western Australia involves extensive public involvement at all stages, ranging from a review of a summary of the initial proposal through participation in setting guidelines for assessment of major proposals and extensive public review and comment, to various appeal processes. These procedures are coordinated by the EPA.

A separate Social Impact Unit (SIU) has been established by the Government to facilitate interaction between the local community and developers. It helps both sides to develop social contracts and to resolve issues through informed bargaining (Carbon 1991). It deals with developments that will alter the way people live, such as the establishment of a major industry. Many projects are not considered because of limited resources. It is a conflict prevention program, and it is rare for issues in which the SIU was involved to come to court. It may be that the system is not easily transferable to larger metropolitan areas or States; nevertheless, its principles of early involvement and full flow of information to the community are widely applicable.

South Australian legislation

As in Victoria, the EIA process in South Australia is within the planning process, with the Office of Planning and Urban Development administering the *Development Act (1993)*. Through this recently authorized legislation South Australia provides a model of a strategic planning process which will incorporate a range of health related issues. The EIA part of the same Act will be used for the assessment of health matters in development which may have major environmental, social or economic impact.

Local government may also be involved in HIA through Environmental Health Plans as a means of reporting under the ***Public and Environmental Health Act (1987)***. Whilst these municipal health plans lie outside the EIA process, they can illustrate the range of health issues which concern communities and the variety of ways in which those concerns can be dealt with.

Pilot municipal health plans have been prepared in five council areas: Enfield, Noarlunga, Whyalla, Barossa and Port Adelaide. Each area adopted a different approach, determined by the identification of the significant problem by each council and community. The approaches ranged from a detailed grid analysis of health problems to examination of the movement and control of particular hazardous materials. Each study revealed significant environmental health problems; together, they revealed many approaches and values in identifymg and tackling those problems. It was concluded that the preparation of a municipal health plan not only educates and informs all participants, but helps to focus the use of limited resources on the most serious perceived health problems in the community. A case study based on the LeFevre/Port Adelaide plan is incorporated m Appendix 2.

South Australia also provides an excellent model of a broad 'strategic planning' process which incorporates health issues explicitly. The planning review for Adelaide, 2020 *Vision: Ideas for Metropolitan Adelaide* (Department of Environment and Planning, S.A. 1991), sets out the planning/policy framework necessary to provide guidelines and context for the health and environmental impact assessment of subsequent development proposals.

In the 2020 Vision plan, health is discussed in the context of equity and quality of life for the community:

> Many people are concerned about risks to health through living m particular parts of the city, doing certain jobs, or suffering particular kinds of pollution. People at the lower end of the socio-economic scale tend to have worse health.

Nevertheless, the existing legislative framework makes it difficult to implement principles designed to enhance health and quality of life. Apart from the *Planning Act,* some 200 other State Acts impinge on planning decision-making.

The *Planning Act* itself deals with development control and facilitates reactive control more easily than strategic planning. For Adelaide itself, the *City of Adelaide Development Control Act* set up a separate planning system; a single system, however, may be preferable. Hence a Strategic Plan is proposed to 'express all state policies for development in the form of objectives and broad strategies ... to act as guidelines for statutory plans, to provide a framework for government agency plans, and to act as a guide to the acceptability of proposals not envisaged in statutory plans (so-called major projects)'. It is these 'major projects' which will be subject to EIA.

Tasmanian legislation

As in most other States, EIA in Tasmania is handled by the Department of Environment and Planning, and, as in Queensland, this department also has responsibility for pollution control legislation, under the *Environmental Protection Act (1973).* Health aspects are dealt with in consultation with the Department of Community and Health Services, and the Minister has control over local environmental health issues.

The *Environmental Protection Act* requires 'Environmental Management Plans to be formulated and put on public display. Licences are required for scheduled industries. This excludes hydro-electric dams, power lines, tourism and roads, but good interchange exists between departments regarding developments within these industries, or others that may not be part of the Department of Environment and Planning's responsibilities. The Department of Primary Industry, for example, would have responsibility for reviewing a fish farm development proposal, but it would do so in consultation with the Department of Environment and Planning.

There is no statutory requirement to display the environmental impact statement publicly. Companies may do so, however, in the public interest. Specific examples, such as the Wesley Vale pulp paper development, have released their Environmental Impact Statement to the public because legislation such as the *Northern Pulp Mill Agreement Act 1988* has required them to do so.

There is little consideration of social impact at present in the environmental impact assessment process in Tasmania.

The Health Minister has ultimate control over local environmental health issues and the Department of Community and Health Services has the responsibility for coordinating environmental health. The Department of Community and Health

Services has established a liaison group with the Department of Environment and Planning to discuss strategies on environmental issues before conflicts arise.

Northern Territory legislation

The Conservation Commission of the Northern Territory coordinates EIA in the Territory. Even subdivisions are often referred to the Commission because they involve a conversion of Crown land. Preliminary Environmental Reports and Environmental Impact Statements form part of the decision-making procedure, and contacts with other departments are close because of the small population of the Territory. This ensures that planning, land-use development proposals and plans of management are all referred for comment by Health and other relevant departments such as planning and environmental protection. All preliminary environmental reports, public environmental statements and EISs are similarly scrutinised. The Health Department also has a substantial input into the development of guidelines for individual proponents to assist them in preparing an EIS.

The Department of Land and Housing develops strategic land-use plans which seek to incorporate zoning, engineering, infrastructural, environmental and health issues etc into early stages of the planning process.

Many of the major environmental issues concern mining operations, and these have been of such national significance that the Commonwealth Government has been involved m the decision-making process, under powers given by specific Acts, eg the *Environment Protection (Alligator Rivers Region) Act* 2978.

Australian Capital Territory legislation

EIA in the ACT is administered by the ACT Planning Authority which is within the Department of Environment, Land and Planning. The *ACT Land (Planning and Environment) Act 1991* covers the planning and leasing of land, management of public land, heritage concerns and EIA. The EIA process is focused more on project planning than on regulation, and is linked with the Territory Plan which defines land-use policy in the ACT.

The Act defines 'environmental impact' so as to include policy and physical change to the natural, social, built and economic aspects of the environment, and it specifies that EIA should include the 'effect on a community' from, for example, the public health, safety and social points of view.

The legislation ensures that the ACT community is formally consulted on assessment proposals, firstly through a Preliminary Assessment. This initial review of the potential impacts of a proposal is released for public comment, and it may lead to further assessment such as an Inquiry, Public Environment Report or Environmental impact Statement.

Health-related issues are also considered in the Territory Plan, and in particular, in guidelines to the Territory Plan. These guidelines address a range of matters such as water quality and air quality objectives and land-use constraints for contaminated sites.

Local government

Currently, local government environmental health officers are involved in the implementation of a wide range of activities including monitoring of air quality, noise pollution, protection of the built environmental, heritage and conservation, waste management, recycling, water monitoring, litter and urban runoff controls, and stormwater disposal. Local government is involved in enforcement of legal regulatory provisions as well as preservation of community amenity, protection of local environments, and health education and promotion.

Environmental health and building surveyors are involved in food licensing and surveillance, food sampling and food hygiene education. In the area of public health their role includes occupational health and safety responsibilities under the *Public Health Act* and related legislation and prevention of communicable diseases. Environmental health surveyors are also increasingly responsible for surveillance and pollution control, and assessment of environmental impact studies and audits. In New South Wales. they are responsible for development control, building inspections, consideration of the impact of buildings upon community amenity and compliance with planning and building regulations, under the *Local Government Act* (specifically Ordinance 70), *Environmental Planning and Assessment Act* and related legislation.

Whilst there are many differences (in geography, resources, personnel, community) between local governments and shires, there are also many common areas including a community base, accountability to the commumty, and legislative responsibilities. Local government can play a significant role in the preservation of the natural environment, construction/preservation and improvement of the built environment, resource conservation and waste minimisation. Currently environmental health surveyors have limited scope to work with planners **m** EIA.

In response to the increasing involvement of local government in environmental health planning, the Australian Institute of Environmental Health has produced a Handbook for Environmental Health Officers on preparation of Municipal Health Plans. The handbook makes it clear that municipal health plans lie within the framework of the 'New Public Health' in identifying lifestyle and environment as important influences on public health. The Institute has also developed an environment management model for Local Government (1991) and guidelines for providing environmental services and amenities.

3.4 Towards a more integrated approach

The respondents consulted in the preparation of this report recommended overwhelmingly that Health Impact Assessment and Environmental Impact Assessment should be closely integrated. To set up separate procedures would involve unnecessary cost, inconvenience, delays, legislative complexities and uncertainties of responsibility. An integrated system of E&HIA is imperative, although even within such a system, some environmental health problems will receive little or at best inadequate attention.

Governments at Commonwealth, Territory and State levels are concerned with establishing an appropriate policy and planning framework for EIA. In many cases this is being done within the context of ecologically sustamable development; it is given force by establishing bodies to coordinate and integrate environmental management, such as EPAs; and it is reflected in the frequent linking of environment and planning in a single department responsible for EIA and planning.

The Inter-Governmental Agreement on the Environmental provides a mechanism to set uniform national goals, standards and guidelines for air, water, contaminated land, disposal of hazardous waste, motor vehicle emissions and waste minimisation. The Agreement focuses largely on statements of principle and definitions of responsibility between the Commonwealth and States. Its principles will guide the establishment of a National EPA (NEPA), a consultative council of government ministers from the States, Territories and Commonwealth with representation also from local government supported through adoption of Commonwealth/States compatible legislation. NEPA will publish draft standards, guidelines and environmental goals accompanied by an impact statement for its proposals, which will include:

- the environmental objectives and rationale, and the environmental impacts of not adopting the recommended proposals;
- alternatives to achieve the desired environmental objectives, and the reason for their rejection;
- m assessment of the economic and social impact on the community and industry as a result of accepting the proposals; and
- the manner in which any regional envirgnmental differences in Australia have been addressed in the development of the proposals.

A memorandum of understanding has been negotiated between the National Health and Medical Research Council and the Australian and New Zealand Environment and Conservation Council to enable the two organisations jointly to establish priorities, allocate responsibilities, and set a timetable for the development of harmonised health- and environment-based guidelines and standards.

The Commonwealth EPA (CEPA) is an advisory and technical body which addresses environmental issues and long-term solutions. It is also to develop environmental monitoring data bases and institute a State of the Environment reporting system. CEPA's activities are designed to complement and support those of other agencies, including NEPA, and its functions and policies are to be developed in consultation with them.

CEPA sits within the context of Commonwealth policy on ecologically sustainable development and is a response both to the conservation movement's demand for stronger action and to industry's call for clear standards. The *Position Paper on the Proposed Commonwealth Environmental Protection Agency* (Commonwealth

Government of Australia 1991) set as a major aim better collaborative arrangements with the states. The Paper gives the requirements for an effective approach to environmental protection issues:

- recognising:
  - the need for ESD;
  - the need for good scientific work;
  - that technology can provide some solutions;
  - people's right to a clean healthy environment;
  - people's right to access to information;
  - the international aspects of local issues; and
  - individuals' responsibilities to the environment;
- integrating environmental decisions into policy development;
- internalising costs — polluter or user pays;
- avoiding anthropocentrism;
- achieving balanced assessment and management of risks;
- avoiding waste and emission generation — clean production; and
- providing for public participation in decisions.

The Commonwealth EPA should, in the view of Fowler and Rutherford (1991), 'accomplish results which until now have been beyond the grasp of environmental authorities in this country' by 'forming a coalition with the public' to pursue a 'safe and healthy environment'.

State governments are also reviewing their procedures and legislation. The Department of Planning in New South Wales has released a Discussion Paper *Modernising the Planning System in New South Wales* which considers giving local government a greater role, streamlining decision-making and using mediation more effectively in resolving disputes. New South Wales has introduced an EPA to embrace the pollution control functions of the former State Pollution Control Commission, and provide for environmental auditing and performance review. This body has an advisory Community Consultative Forum, including three 'ecology, environmental, health or conservation' representatives as well as members from industry, and State and local government. Planning and EIA functions will remain with the Department of Planning, but the EPA will work with that department to build pollution guidelines into the environmental impact assessment processes. South Australia proposed a similar body in 1991, along with a Charter on Environmental Quality. In September 1991, Queensland released a Public Consultation Paper proposing an EPA, with a strong emphasis on statewide environment protection policies. Both Victorian and New South Wales planning agencies will have E&HIA frameworks ready for Cabinet consideration before the end of 1993.

3.4.1 Models of environmental management integrating local and legislative contexts

Municipal Environment and Health Management Plans such as those introduced in Victoria and South Australia provide a means of carrying out preliminary community consultation and collection of data.

Resource management procedures also provide models for possible frameworks for environmental health impact assessment. The Natural Resources Management Strategy for the Murray-Darling Basin released by the MDB Ministerial Council in 1990 describes the roles of 'Communities of Common Concern'. The Ministerial Council is responsible for setting policy, which is then implemented by the Murray-Darling Basin Commission. A Community Advisory Committee advises the Council of community views, and its decisions on policy are transmitted by the Committee back to the community. Groups of individuals working together ('Communities of Common Concern') identify and manage the problems in their particular locality. They have access to the Ministerial Council through the relevant State ministers, and are supported technically by relevant State or Commonwealth agencies. The concept is flexible, embracing everything from small groups such as a 'landcare' group addressing a narrow, localised issue, to integrated networks of action groups addressing a broad range of regional issues.

The Queensland State Government is currently sponsoring a project entitled 'South East Queensland (SEQ) 2001 Growth Management'. As part of the project, a Regional Planning Advisory Group (RPAG) addresses problems of urban development, structural change and environmental management. All stakeholders (government and non-government) in the region are involved formally through membership of the RPAG, which consists of State and local government representatives, as well as non-government members from the business, union, professional, environmental and community sectors. Throughout the developmental phases all stakeholders provide technical advice and assistance. This occurs mainly through participation on one of the five RPAG working groups, however there are a range of other levels of technical involvement, particularly for representatives from the three levels of government, during the drafting phases leading up to the consideration of project papers by the RPAG in formal session.

The RPAG assists State and local government to develop a framework for managing growth and change in southeast Queensland. It provides a forum in which diverse sectoral views can be canvassed and agreement sought. The primary output of this process is policies relating to institutional arrangements, financial matters or regulatory provisions.

This process was formally established in 1991 and a number of its position papers are currently subject to public comment.

The Social Impact Unit in Western Australia, discussed above, illustrates the benefits of early mediation between developer and community. Its pro-active focus is in contrast to the adversarial style which characterises many environmental disputes. For example, although dispute resolution in the New South Wales Land and Environment Court may take place before assessors rather than a judge. This

remains essentially a legal and adversarial situation rather than a forum for conflict resolution, and it becomes relevant only when a dispute has already arisen. Some disputes will be inevitable and no amount of early consultation will avoid them. While the *New South Wales Environment Planning and Assessment Act* provides for public access to information, public display of the EIS, public inquiries in matters of significant public interest, and participation by any member of the public (not only those directly affected by a proposal), some issues still end m the Land and Environment Court if these earlier procedures fail to resolve the conflict between the views of the proponent and those of the determining authority or community.

3.5 Conclusion

A number of deficiencies exist at all levels in the current planning and development approvals system, including the formal EIA process. If HIA is to be incorporated effectively and feasibly into EIA, a number of structures and processes will need to be negotiated and established.

An appropriate policy and planning framework should include:

- environmental and planning laws which specify public health as a factor to be considered in project approval processes;
- policies which incorporate public health principles into local and regional planning and development guidelines; and
- strategic regional plans which provide guidance for consistent decision-making about individual projects in the context of cumulative effects on catchment areas.

Structures are needed to coordinate health input to EIA, including:

- a coordinating agency for EIA at State level with adequate internal expertise to recognise potential health issues, and with formal links to health expertise in other sectors;
- clear guidelines specifying potential health concerns and criteria; and
- procedures to improve access by proponents, communities and decision-makers to expertise on methodological and technical problems in public health surveillance.

Procedures to facilitate community involvement should include:

- economically feasible strategies to involve communities in planning and impact assessment from the early planning stages through to decision-making and evaluation;
- procedures to improve community access to information about proposals, and to negotiate acceptable standards of risk; and
- procedures for defining the limits of financial commitment for community consultation by the proponent.

Withdrawn

Effective project decision-making requires:

- setting of acceptable risks and standards;
- agreement on methods for assessment of project performance and risk evaluation; and
- established dispute resolution procedures, and specified time frames within which decisions should be made.

Finally, clear guidelines need to be developed on environmental auditing of projects and on project closure, funding, processes and timing.

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4 A framework for Environmental and Health Impact Assessment

4.1 Introduction

The proposed framework for Environmental and Health Impact Assessment is outlined in Box 4.1. The steps in the process are not intended to stand alone but to be incorporated as part of the EIA process; they are essentially the steps through which an EIA progresses normally, with each one expanded to include specific issues relevant to health.

It must be emphasised that the following discussion is comprehensive; it should not be taken to imply that all the points identified should be addressed in all assessments.

Screening, scoping and ***profiling,*** currently components of the EIA and SIA processes, identify the parameters for environmental health impact assessment. The three processes may not be chronologically and methodologically distinct, although the steps and the processes involved in each are necessarily presented separately in this chapter. They occur early in the planning of an E&HIA when important decisions are taken in relation to predicting health and social impacts and identifying the key components of assessment. They provide the basis for evaluating both the E&HIA and the project implementation.

Once the need for E&HIA and the characteristics of the relevant population and environment are identified, the impact assessment should proceed within a framework of ***risk analysis,*** which consists of ***risk assessment*** and ***risk management.*** Successful models for health risk analysis and consultation with affected groups have been developed in the context of occupational health and safety. Aspects of these should be applicable to E&HIA.

Measuring the success of health impact assessment depends on having a suitable methodology to assess the actual effects of a given development or policy on the health of affected populations, and increasingly, upon the global environment. Mechanisms need to be developed or refined to evaluate both the effectiveness and efficiency of the E&HIA process and the effects of specific developments. EIA is not a definitive predictive tool, and it must be followed by sensitive and on-going ***monitoring and evaluation of projects*** to provide a basis for improved predictive capacity.

Steps in the E&HIA process

Preliminary analysis

Step 1 *Screening*
Does this project need an E&HIA?

Step **2** *Scuping*
What issues must be addressed in the E&HIA?

Step **3** *Profiling*
What is the current status of the affected population and the local environment?

Risk analysis

Step ***4*** *Risk assessment*
What are the risks or benefits?
Who will be affected?

Step 5 *Risk management*
Can risk be avoided or prevented?
Are better alternatives available?
How can benefits and risks be 'costed'?
How can differing perceptions of cost and benefit, nature and magnitude be mediated?
Will predictions of future health risk be robust enough to withstand legal and public scrutiny?

Implementation

Step 6 *Decision-mating and implementation*
Does the assessment provide sufficient, valid and reliable information for decision-making?
Is there a conflict to be resolved?
How will conditions be enforced?
How and by whom will impacts be momtored?
How will post-project management be resourced?

step 7 *Monitoring, environmental and health auditing, post-project evaluation*
Is the project complying with its conditions?
How well are those conditions achieving the desired outcomes?
How well is the E&HIA process as a whole achieving its aims of protecting the environment and health?

Box 4.1

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4.2 Preliminary analysis

Step 1: Screening

Does this project need an E&HIA?

Screening aims to identify, as early as possible, those projects which have potentially significant impacts and which should be subject to E&HIA.

The screening process should be established by relevant authorities m association with health authorities. Accountability to the public by those authorities should be established through routine publication of lists of proposals indicating which have not been specifically subjected to E&HIA. Most environmental legislation has a *de facto* screening operation in that it designates the type of developments subject to legislative control. There must be community input into the definition of screening criteria, and ideally this input should take place through development of policy and legislation. Currently, screening is usually carried out by the authority responsible for development planning and may or may not involve consultation with health and community authorities. Health input is important, although it is frequently omitted at this stage unless policies and legislation require mandatory consultation with health authorities for designated developments.

Not all potential impacts on health are negative. Many developments, such as facilitiesdesigned to improve waste minimisation or disposal or water supply facilities, may result in benefits which clearly outweigh potential adverse effects. It is important to identify the potential positive health impacts as well as the negative ones since this will make a significant contribution to the cost-benefit analysis and final development decision.

Screening for potential health impact requires the establishment of contact with community networks and, in consultation with them, a rapid assessment:

- against a checklist of criteria for public health risk which establish the need for E&HIA;
- in the light of local demographic data, to identify vulnerable populations;
- in the light of local environment data, to identify ecosystems which are vulnerable, and damage to which may cause health effects.
- of public interest and/or concern; and
- of contribution to disturbances to the global environment.

Several criteria which indicate the need for E&HIA have been described (WHO 1983), including:

- **Threshold criteria** based on size, cost or pollution levels. In some countries, the need for an EIA is determined on the basis of the size of a program or project as measured by the scale of investment, size of land or population affected, and the quantity of product, effluent or waste generated. Size is not sufficient as a sole determinant. Environmental significance must be judged by cumulative impact

and whether the impacts are transient or long-term. Policies which use quantitative criteria such as the size or cost of a development are also notoriously easy to subvert and, where health is a major consideration, qualitative criteria may be more appropriate (eg is this the first such development in the area, or will it have cumulative or synergistic impacts?).

- Locational criteria based on the designation of sensitive areas, such as water catchment areas, fish breeding areas or, in an urban context, areas adjacent to hospitals or schools. Locational data which are particularly relevant to health include:
  - the geography and climate of the region and its potential for dispersion of pollutants and toxic materials;
  - the potential for disturbances of ecology which may influence the presence of disease vectors such as mosquitoes; and
  - the existing burden of ill health of the population.
- Inclusive and exclusive lists, that is, lists of those types of projects which always require an E&HIA, and those which never do. Most existing lists of projects requiring mandatory EIA relate to the nature of the activity itself rather than to the receiving environment; for instance, they constitute a list of industries (such as nuclear energy or smelting) or large-scale developments (such as airports or freeways). However since human health is dependent on the quality of human environments, the characteristics of the receiving environment and its relationship to human ecology may be as relevant to decision-making as the characteristics of the development itself.
- Initial environmental evaluation (IEE), that is, a preliminary feasibility study or environmental assessment to determine the likely need for a full-scale E&HIA. The qualitative and quantitative characteristics of affected human populations should always be included in an IEE.

Local communities of interest or community networks should be identified and their collaboration sought in the E&HIA process, as in many cases these networks will provide valuable additional input which is not available from peak community groups. They may be particularly helpful in identifying vulnerable population groups and in gaining access to those groups for negotiation of aspects of the proposal which need to be designed with their concerns in mind.

An element of judgement will always enter into decisions at the screening phase. The checklist in Box 4.2 sets out the types of projects which should be screened by health authorities to assess the need for mandatory E&HIA. The list is consonant with the *Guidelines for Identification of Environmental Significance* promulgated by CEPA (see Appendix 5) which are recommended for all E&HIA in all States/ Territories and the Commonwealth, and it reflects National Health Goals and Targets.

Projects that should be screened by health authorities

Developments, activities or policies which:

- generate desirable health impacts such as water supply or waste disposal;
- may cause substantial changes to the demographic or geographic structure of a community;
- have the potential to expose workers to hazardous products and processes in the workplace, including indoor air quality;
- open settlements or areas which have the potential to damage ecology, reduce air or water quality to an unacceptable level, introduce disease vectors or parasites, or render recreational facilities and water resources unsafe;
- impact significantly on populations which are already vulnerable to ill health (eg rural Aboriginal communities, retirement communities);
- impact significantly on land productivity for horticultural and pastoral activities and are detrimental to the socioeconomic status of dependent communities;
- affect the microbiological or chemical safety of food chains and food supplies;
- substantially increase the demands on public amenities and sewerage infrastructure;
- involve the storage, transport and disposal of hazardous or toxic materials or wastes, including those that are clinical and infectious;
- produce particulate, gaseous or liquid emissions, significant quantities of solid waste, or other noxious substances (eg radiation);
- generate significant noise, traffic flow, or risk of injury; and
- generate a high level of community concern (eg airports, freeways).

Box 4.2

For each type of proposal, health authorities should be responsible for providing a rapid assessment checklist of key potential health effects. The scopmg team (see Step 2, section 4.2) should then include these in the brief to the proponents. The list in Box 4.2 is derived from the workshop and responses to the national survey of EIA practitioners and environmental health and community groups conducted as part of this project, from the EPA Guidelines for Environmental Significance, and from criteria elaborated by Go (1987, p. 8).

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Step 2: Scoping

What issues must be addressed in the E&HIA?

Scoping identifies the issues to be considered in depth in each proposal and those to be eliminated from the E&HIA and it allocates responsibilities for preparing the assessment (Ross 1991). It gives stakeholders the opportunity to identify areas on which the E&HIA should focus and it offers the first opportunity for community participation in the assessment and planning of a proposed development.

Victoria appoints consultative committees to guide the preparation of the environmental impact statements. These are 'low key consultative groups which give parties with an interest in the proposal an opportunity to exchange views, and have input into the information provided to the public and decision-makers' (Saunders 1991). The work of the Western Australian Social Impacts Unit, discussed in Chapter **3.3.2**, also involves a range of community participants in the scoping process.

The tasks in scoping are set out in **Box 4.3**, and discussed in the remainder of this section.

Tasks in scoping

- Identify key stakeholders.
- Identify potential health and amenity concerns.
- Determine whether alternatives to the proposal need to be considered.
- Provide guidelines for the proponent specifying:
  - goals for impact assessment and criteria for monitoring;
  - minimum information requirements;
  - nature and location of relevant existing health data;
  - relevant bio-technical standards and inventories;
  - relevant social and cultural health indicators;
  - relevant biological and social assessment methodologies;
  - recommended consultation strategies and funding commitments;
  - recommended post-project evaluation and monitoring protocols; and
  - local agency requirements and policies.
- Determine the responsibility of proponents, health agency and other stakeholders in the preparation and assessment of the E&HIA.
- Negotiate costs and cost-sharing.

Box 4.3

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Identify stakeholders

Six groups concerned with the outcomes of E&HIA are:

- the proponents of projects;
- the decision-makers at all levels of government;
- the practitioners of E&HIA;
- those responsible for health and welfare planning and service provision;
- the workers and community members who will be affected by the development; and
- environmental planners and advocates.

Each of these groups may have different concerns, different needs for information and different criteria for evaluating outcomes. (Each group should also hold a brief for future generations, although this may need to be affirmed as an objective.) The differing perspectives of various stakeholders will help to identify potential health and amenity problems. In the case of a major steelworks, for example, toxicologists may concern themselves with toxic emissions, workers may focus on adequate personal safeguards, local residents may be more concerned about the impact of a 24-hour industrial operation on nocturnal noise levels and heavy vehicle traffic and health professionals will want to ensure that adequate facilities are provided for emergency trauma management.

Scoping provides the opportunity to identify and negotiate priorities among these differing needs as they apply to specific proposals. Where stakeholders are identified and involved early the process of negotiation can carry through the entire E&HIA process and this may result in more suitable alternatives being identified for the proposed development (Gusman and Harter 1986).

Input from and consultation with community groups including relevant unions or workers' associations should occur at all steps in the E&HIA process. The methods for achieving this and for funding it should be agreed and specified at the scopmg phase.

It is not possible to prescribe a standard method for the difficult task of identifying community representatives. The size of the community and the type, nature and scope of the project under consideration will determine whether it will be possible to ensure direct representation of all community groups -- or even all of those groups who have a legitimate concern. Interviews with key informants will identify the communities of concern which should, as a minimum, be consulted in the process. It is important that scoping explicitly include representation of the workers as well as the proponents who will be involved in the development and who will thus be in the frontline for any adverse health impacts. Their early involvement will minimise the likelihood that the development will be subject to delays during implementation or need modification after it is completed and operational, often a costly exercise.

Health authorities must be involved to assist in identifying human health concerns and to ensure that appropriate methods are used to predict and assess health impact.

Identify potential health and amenity problems

> **Good health and well-being require a clean and harmonious environment in which physical, psychological, social and aesthetic factors are all given their due importance. (World Health Organization 1989)**

While such holistic definitions of health are well accepted by most sectors of the community, there are still some difficulties in putting them into practice. The relative importance of the physical, psychological and social aspects of health will vary with the nature of the proposal under consideration.

Box 4.4 provides a checklist of issues which may be relevant in an E&HIA. It is compiled from published literature and from responses to the project survey. Less obvious implications, although easily overlooked, may become increasingly important as developments bring new concerns related to such things as genetic engineering or revolutionary telecommunications technology and its social impacts.

For many proposals, many issues on the checklist will be identifiable immediately as irrelevant to the proposal and disregarded.

Checklist of issues which may be relevant in E&HIA

Direct effects

- Deterioration of air quality, from factors such as higher levels or novel air pollutants or exposure pathways.
- Deterioration of the quality of water (both surface and sub-surface, riverine and offshore) for human or stock use, or for recreation, from factors such as increased nutrient load or faecal contamination.
- Changes to nutrient loads and water flow routes from storm-water drams and other waste-water disposal avenues which may change hydrological characteristics, aquatic vegetation and hence influence populations of pests or disease vectors.
- Contamination of land, indirectly from leachate or directly from disposal of toxic materials.
- Contamination of plants or animals, from factors such as the release of heavy metals into streams or the use of excess pesticides on crops. Particular attention needs to be paid to accumulation through the food chain and its effect on ecosystems, and to contamination of foods for human consumption.
- Possibility of severe hazard from factors such as major spills of toxic materials or large explosions releasing harmful fumes.

(continued)

Checklist of issues which may be relevant in E&HIA **(continued)**

- Increase in levels of noise from factors such as increased traffic flow or longer periods of traffic flow.
- Other changes in environmental amenity which may directly affect health, such as changes in local climate or increased night brightness near major sporting grounds.
- Synergistic effects of several pollutants or stressors.

Indirect effects

- Increased social impacts as the general environmental amenity decreases or is perceived to decrease.
- Concerns about the possible effects of a changing environment or about the long-term effects of exposure to pollutants, such as the downstream implications of water resource development through reduced crop yield, loss of existing industry or incursion of new vector or vertebrate host species.
- Social effects of a poor environment such as high rates of depression or crime, as well as unemployment and inadequate amenity.
- Population change in response to industrial, urban, agricultural or water resource projects.

Health impacts in specific situations

- Occupational health and safety impacts.
- Indoor pollution effects, from factors such as radon, tobacco smoke, ultraviolet light, noise or infections transmitted through air-conditioning.
- Risk and consequence of injury, for example, transport accidents.
- Cumulative, direct and indirect effects of air or water pollution.
- Health impacts that are of specific concern to the community, eg noise, traffic accidents.

Planning considerations

- Demand on infrastructure and services, especially those directly related to provision of health services.
- Provision for facilities to promote good health in the community affected by the proposal, such as recreational facilities and social support systems.
- Management of wastes generated by the proposal.

(continued overleaf

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Checklist of issues which may be relevant in E&HIA (continued)

- Cumulative effects on the region of adding the impacts from this proposal to those of other existing or likely developments. Resolving problems here might involve considering 'pollution credits' or 'quotas' that could be transferable between like industries.
- Influence of urban layout on mental health and perceived environmental quality. Positive action here might include provision of adequate and usable recreational space or establishing planted buffer zones along major transport routes.
- Creation of new environmental conditions, for instance by the flooding due to construction of large dams, and the resultant new environments for disease vectors.
- Future land use, and the need for rehabilitative work.
- Increase or decrease of injury and exposure to transport emissions due to changes in transport demand arising from the development.
- Choice of a development location which will avoid or minimise effects of existing insect vectors or pest situations, or decrease the likelihood of establishing new sources of these insects.

Related issues

- Definition of conflict-resolution strategies, such as litigation, mediation, expert appraisal panels and mechanisms for unresolved conflict.
- Establishment of post-project monitoring and feedback procedures to check the accuracy of the initial assessment of potential health impacts to allow upgrading of standards or processes in the light of new knowledge and any necessary remedial action.
- Availability of staff and other resources required to implement decisions.
- Shifts in social or cultural norms, such as those generated by genetic engineering, telecommunications, transport and employment innovations.
- Population growth.

Box 4.4

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Determine whether alternatives to the proposal need to be considered

Possible alternatives should be considered at the scoping stage in light of the potentia1 health-related and environmental problems that are identified. In the opinion of Go:

> ... **conceptualisation of alternatives is the most important and critical part of the scoping exercise. Without viable alternatives, the range for decision-making is limited ... The 'no action' set must always be considered since it is the reference used for comparing the impacts of other alternatives.** (Go 1987, p. 11)

Provide guidelines for proponents

E&HIAs must take into account any adverse effects stemming from existing developments and the possibility of interactive or multiplier effects in relation to new developments. The brief for consultants should include qualitative criteria to ensure that they consider:

- the total pollution burden on air, water and soil in the region; and
- site analysis, taking into account the proximity to sensitive community facilities such as schools and low-cost housing estates and potential **future** uses of adjacent land.

The ANZECC Working Party on the National Approach to EIA noted that:

> **Guidelines to protect the receiving environment should have primacy over industry or technology-specific guidelines based on emission concentrations or loads. In this regard it should be noted that ANZECC has made considerable progress towards national guidelines for air quality, water quality, noise, contaminated sites and intractable waste. ((ANZECC 1991, p. 10)**

The scopmg team should refer the proponents to these and other health-related guidelines and standards developed by NHMRC, NOHSC, ANZECC and Standards Australia, and should require that proponents explicitly consider the implications the proposal might have for maintaining those standards.

The effectiveness of guidelines is limited by the current very incomplete understanding of the health effects of individual and combined environmental hazards. Traditional epidemiology and toxicology have well-developed methods for measuring health effects once they are observed, and for predictive modelling for known hazardous substances with known magnitudes of effect. The vast range and complexity of environmental hazards, even in the chemical area alone, makes uncertainty and unpredictability inevitable. The processes and difficulties of hazard and risk analysis are discussed under Step 4 (section 4.3).

Assessing the social and psychological aspects of health poses an even more formidable task as they are often affected by less tangible (and measurable) factors than toxic chemicals. Expertise in risk analysis in the social aspects of health is likely to be inadequately represented in groups which conduct EIAs and in the health and planning authorities which evaluate them, given the prominence, in the field of impact assessment, of quantitative risk assessment and biological and toxicological analysis. **Scoping teams should therefore take particular care to**

include guidelines which identify appropriate sources of social indicators and sources of expertise for identifying relevant social and cultural impact.

Evaluation criteria must be established at this stage. Scoping teams must negotiate project-specific, recommended-minimum protocols for post-project monitoring and for the evaluation of the E&HIA process itself. Effective evaluation depends on knowing the relevant baseline parameters. Monitoring and evaluation of each E&HIA will contribute to such knowledge through the development of environmental health databases, assessment methodologies and professional expertise. For this reason, all health-related data generated as part of E&HIA should be incorporated into public health databases and local and regional profiles, as a basis for future developments and decisions. The databases and profiles will need appropriate and ongoing resourcing within the public health system. If the development of regional or municipal public health plans becomes policy in all States, then much of the baseline demographic, geographic, morbidity and mortality data and data on high-risk populations should become available within the public health system.

Forecasts of environmental and health impacts are largely based on assumptions, estimates and extrapolations made during the planning stage. Monitoring, feedback and adjustment mechanisms are therefore necessary to test the validity and accuracy of these assumptions and to provide a mechanism for rapid adjustment of control strategies to changing or unexpected conditions. These issues are elaborated under Step 7, Monitoring, auditing and evaluation.

Determine the responsibility of proponents, health agency and other stakeholders in the preparation and assessment of the E&HIA

Negotiate costs and cost-sharing

Proponents must have predictable and quantifiable guidelines to follow. Costs for preparation of an E&HIA should be budgetted at the scoping phase, including mechanisms for resourcing community consultation. Where appropriate, cost sharing for aspects of the E&HIA should be negotiated and specified at this stage.

Step 3: Profiling

What is the current status of the affected poplation and local environment?

Profiling is the process of establishing the baseline condition of relevant parameters of the affected community and environment so that likely impacts can be predicted and subsequently monitored. The term is derived from social impact assessment.

It is neither possible nor desirable to distinguish social impact assessment from health impact assessment. Both assume a holistic definition of human health and well-being and both view the relationship between individuals and groups, and their physical and social environments from an ecological perspective. Social impact assessment has been recognised longer as a distinct component of EIA because of the need to draw explicit attention to social as well as biological impacts of development. Health impact assessment draws attention to the need to integrate social and biological impacts into an overall analysis of health outcomes.

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Community cooperation is essential in profiling, especially with regard to providing personal medical information where it is relevant. Data gathered during screening and scoping will probably provide a superficial overview of community characteristics. Profiling should investigate in more depth *m y* aspects of the community which are likely to be particularly vulnerable to the proposed development. In most cases the profiling process will call upon existing regional health and social data, but in some cases it may require the collection of site-specific data.

The World Health Organization (WHO 1985) identifies two areas of baseline information relevant to environmental health impacts:

- information about the existing environment used to determine existing environmental health factors within an area (eg current levels of pollution, transmission pathways for existing disease problems); and
- information on existing levels of human health, behaviour and exposure to health hazards which is needed to identify the pathways by which people are exposed to environmental health determinants. This includes the size, location and characteristics of the existing and incoming populations, particularly the degree of contact with environmental health determinants, and current health problems including prevalent diseases and immunities in both the local population and incoming settlers.

A summary of the types of baseline data which may be relevant m profiling is presented in Box 4.5. Existing environmental monitoring is often not adequate to provide a database to assess the regional spread of pollutants, let alone the impact of those pollutants on the community. There is an urgent need for databases which can be continuously updated and which are linked to national surveys of health and socioeconomic indicators. The list should therefore be viewed as an ideal towards which developing datasets could be targeted. It is not suggested that proponents be solely responsible for developing those datasets or for the costs incurred in their development. While some data identified as essential by the scopmg team will need to be generated, some are likely to be available. All data should be accessible and in compatible format to facilitate entry into relevant databases for use in other E&HIAs.

Baseline information which contributes to profiling

- Characteristics of the existing and incoming populations of the region including size, age structure, socioeconomic status, groups at risk.
- Physical characteristics of the region, such as frequency of atmospheric inversions, variability of river flow, orientation of prevailing winds, water tables, geological stability.
- Existing land uses, especially those that can be considered incompatible with or inappropriate to the proposed development.
- Current health status of the population including morbidity, mortality, and social and psychological health indicators. (Data collection using sentinel populations which is coordinated by a central body would be useful here.)
- Current levels of pollutants and environmental degradation.
- Existing data and studies concerning the types of problem likely to arise from the development. The reliability of these data needs to be carefully considered, especially if they relate to a region or population which differs from that for which E&HIA is being carried out.
- Existing standard of living of the population especially in relation to factors such as access to water supplies, adequacy of diet, and access to health facilities.

Box 4.5

Information used for predicting impacts must be site-specific and evaluated for its relevance: information from one area or situation cannot be assumed to apply equally to another area or situation, even if it appears similar.

Existing baseline information should be assessed to establish what information is already available from local or national government statistics or from previous studies. Limitations in the data should be noted: national or regional aggregated data may disguise important local differences and data which are several years old may fail to reveal important recent changes in population or environmental health status.

The precise data requirements will depend on the nature of the proposed development and on the characteristics of the environment and population of the area.

The quantitative data necessary for the preliminary rapid assessment phase of an E&HIA will be drawn essentially from the compilation and analysis of existing data. An example of data required for industrial developments is provided in Box 4.6.

Ong et al (1991) describe a process of rapid appraisal in a community (Box 4.7) which identifies what the problems are, rather than how many people are affected. It is based on the WHO 'Health for All' philosophy and draws on the principles of equity' participation and co-operation across sectors — all equally relevant in environmental health. It addresses the need for equity by focusing on members of urban environments who are denied the benefits available to affluent sectors; it ensures participation by using key informants; and it achieves multi-sectoral cooperation through the use of 'resourceholders from various organisations to do the investigations and to make a plan of action'. In appropriate contexts these qualitative factors may be combined with the quantitative data described in Box 4.6.

A case study of approaches to preliminary risk assessment in the LeFevre Peninsula is described in Appendix 2.

Minimum dataset for industrial development proposals

- Best available quantitative description of diseases related to pollutants associated with the development.
- Best available quantitative description of the dispersive, absorptive and adsorptive mechanism in air, water and soil.
- Information on concentrations of the pollutants over the various periods of time to which the affected population groups, including workers, will be exposed.
- information on environmental, social and economic factors which are likely to influence the susceptibility of the affected population.
- Forecasting of health effects including their intensity, duration, and lag time between exposure and effect.
- Assessment of short- and long-term health impacts.
- Identification of and the means by which the health effects could be eliminated or reduced.
- Assessment of the health impacts of alternatives.
- Definition of the health monitoring system to be instituted together with the activities of the proposed project.

Box 4.6 (Gilad 1984)

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Qualitative factors to be assessed in a rapid appraisal for urban development

- Community composition.
- Community organisation, structure and resources.
- Community capacity — commitment, mobilisation.
- Physical environment — housing, transport, open space.
- Socio-economicenvironment — incomes, employment, education, literacy, types of housing.
- Disease and disability profile — major health problems.
- Health and environment services — serviceuse and acceptability.
- Social services — service use and acceptability.

Box 4.7 (Adapted from Ong et al 1991)

Preliminary or feasibility studies may in themselves, satisfy community consultation requirements. Bender et al (1988)have described a study of cancer risk and public water supply contamination which illustrates the ability, at modest cost, to investigate community concerns, identify information needs and deficiencies, outline potential study options and costs and establish the rationale for further expenditure. They emphasise that the feasibility study itself m y resolve many community and scientific concerns.

The World Health Organization protocol for rapid assessment of regional environmental health problems adopts a similar feasibility study approach (WHO 1983, p. 12). It is based on information readily available from environment and health agencies and can be completed for a city with a population between two and four million in a matter of weeks. The method considers air, water and land pollution and provides an integrated pollution profile which indicates the most urgent problem and those which may be emerging. The assessment can be updated as new information comes to hand and can be expanded as resources permit. Kim (1990)describes such an assessment for the city of Seoul.

4.3 Risk analysis

Risk analysis is best understood in two phases:

- Risk assessment: tie identificationand essentiallyquantitative assessment of environmental health hazards and the relative risks of various options. This is a predominantly scientific enterprise which may involve science policy decisions based on objective and quantifiable features of the agent or development.

- Risk management: the process by which a regulatory agency and community decide what to do about the results of a risk assessment. Decision-makers and interest groups develop policy, guidelines or management procedures based on the results of risk assessment combined with feasibility and economic and socio-political realities. Risk management involves values, social and political considerations, community concerns and economic judgements and is subject to the constraints of particular statutes.

Risk analysis plays an important but somewhat controversial role in environmental health. Currently it is the primary tool for providing quantitative data aimed at identifying and mitigating environmental health hazards. In any risk analysis there are a number of points at which risk to human health can only be inferred and both scientific judgements and policy choices may involve selecting from a number of options.

The distinction between risk assessment and risk management is not clear-cut. Risk management needs to be incorporated into a broad decision-making framework which considers all relevant parameters, and for this reason, it is frequently recommended that the assessment and management of risk remain conceptually distinct. Indeed, the United States National Research Council has recommended that the two activities be clearly distinguished and separated institutionally in regulatory agencies (Russell and Gruber 1987). Critics of this approach pomt out that it implies that the scientific risk assessment process is value-free. In practice, values and economic considerations are involved even in the earliest stages, m defining the problem and choosing research methods, criteria for toxicity, significance and confidence levels.

Science is a social as well as a technical activity and both the questions it asks and its findings are subject to many interpretations and uses (Bradbury 1989). The technical approach sees risk as an objective physical attribute of hazardous technologies which can be explained, predicted and controlled by science. Risk assessment is never value-free; scientists' judgement involves balancing conflicting evidence. Factual evidence alone does not lead to valid conclusions and here social analysis becomes important.

Most people do not judge risk on the basis of numbers; it is 'more usually a subjective determination using value judgements' (British Medical Association 1990, p. 240). Risk assessment then, is not an objective representation of reality but should be recognised as part of a continuum of political decision-making which determines how risk is defined and quantified as well as how it is managed.

The notion of determining a hazard scientifically is relatively new. Advance forecasting of risk attained prominence in the 1950s and 1960s with the 'fault-tree' or 'event-tree' method of analysis which estimates the probability of a system's failure by considering the reliability of its individual components. The technique was applied first to manned space flight in the United States. The 'probabilistic risk assessment' technique came to wide public attention in the 1970s when it was used for estimating the safety of nuclear reactors (Health and Welfare, Canada 1989).

Risk analysis currently focuses to a large extent on chemical hazards. Serious chemical contamination incidents in North America and Europe provided strong incentives to develop risk analysis techniques and placed environmental health hazards on the public agenda. The discovery of contamination at Love Canal, New York and Times Beach Michigan for instance, contributed significantly to widespread public anxiety about industry and its waste products (Kamrin 1989) and this contributed to the passage of new legislation such as the United States' *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA or Superfund) to deal with contamination of the environment, especially soil and water, by hazardous materials. The release of methyl isocyanate gas at Bhopal, India focused attention on air contaminants and reinforced the previous concerns about industrial activities near residential areas (Karnrin 1989).

In Europe, serious accidents at Flixborough, Beek, Seveso and Manfredonia between 1974 and 1976 highlighted the potentially hazardous nature of industrial activities, particularly when associated with urban areas. These incidents led to the development of the Seveso Directive, a policy developed by the European Community which defines an information framework and requires that mforrnation be generated and transmitted to form the basis for accident prevention and risk management. The majority of European Community Member States are mvolved in implementing and developing the Directive (Otway and Amendola 1989).

Models for risk analysis and risk-based planning have been developed and recommended by the World Health Organization (Giroult 1988), Health and Welfare Canada (1989) and the United States Environment Protection Authority (USEPA Science Advisory Board 1990). The models have much m common and have been used successfully in determining occupational and public exposures. Box 4.8 represents a synthesis of the key principles and processes.

Risk analysis

Risk assessment

- *Hazard identification: Is there sufficient evidence to suggest that a hazard will occur?*
  - Analysis of properties of the development/agent
  - Epidemiological evidence of risk
  - Toxicological evidence of risk
  - Case reports.
- *Risk estimation: What is the likely extent of risk?*
  - Is the risk new or an increment on existing risk?
  - Impacts on environment
  - Dose-response or dose-effect relationships

(continued

Risk analysis *(continued)*

- Population exposure and sensitivity
- At-risk groups
- Land use, lifestyles, consumption patterns
- Route, magnitude, frequency and duration of exposure
- Probability and consequences of accidental events.

Risk management

- *Risk characterisation: Is it the best option, is it worth the* **risk?**
  - Public perception of risk
  - Risk-benefit analysis, incorporating health effects and effects on the human population as a cost item in personal and economic terms
  - Feasibility of alternatives
  - Social, political, and cultural implications of options
  - Uncertainties and assumptions
  - Social justice and equity.
- *Risk mitigation:*
  - Modifying:
    - land-use planning
    - the proposal
    - the environment
    - exposure
    - effects
  - Mitigiating effects (including compensation)
  - Formulating or developing:
    - emergency procedures for acute exposure
    - contingency measures to facilitate detection and timely response to potential problem
    - site-monitoring mechanism to address project closure, risk removal and environmental restoration
    - control measures aimed at building public confidence and trust in the approach taken to project management
  - Incorporating in project approval conditions:
    - recommended modifications
    - criteria and methodologies for health impact audits.

Box 4.8

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Step 4: Risk assessment

What are the risks or benefits?
Who will be affected?

Risk assessment involves identifying hazards and estimating the degree and frequency of risk they pose. The process will vary with the proposal being assessed and with the availability of data. Hard and fast rules cannot be applied, but use of the checklist in Box 4.8 is recommended. Some of the necessary information should be available if a municipal public health plan is in place, and some will be available from published sources such as WHO's Environmental Health Criteria Series, the threshold limit values (TLVs) set out by the American Conference of Governmental Industrial Hygienists (ACGIH), and National Occupational Health and Safety Commission's Consolidated List of Hazardous Substances. Specific research may be needed to obtain information to estimate population exposure and sensitivity, and risk characterisation will involve extensive community consultation.

Risk assessments are quantitative in that they are able, ideally to identify the size of a population affected and the magnitude of the effect based on dose and dose-effect ratios. In practice these data are often either unavailable or incomplete. In addition the available data are based on standard toxicological animal models and they fail to account for interactive effects such as the adsorption of sulphur dioxide onto air-borne particulates which carry sulphur dioxide into the lungs and therefore increase its potential for health damage. Risk assessment should, wherever possible, be based on epidemiological studies of human populations. Most studies have been on populations of workers with known work-place exposures. Determining the effects of the ambient environment on the general population poses greater difficulties because of the problems in isolating impacts and cause-and-effect relationships.

Health impact assessment must identify population groups who are vulnerable by virtue of circumstances such as age, poverty, housing and educational status; or groups who may become vulnerable by virtue of the effects of the development. Exposure assessment will require a knowledge of lifestyles, consumption patterns, and social and economic structures in potentially affected communities. Anthropological studies could be as relevant as toxicological studies to risk assessment for some developments.

Techniques for risk assessment are relatively undeveloped, and there has been little research into the multitude of environmental health impacts which accompany development. Data are available on the characteristics of only a small percentage of the chemicals in use, and for those less-obvious hazards which have social and psychological rather than biological effects, the data are even more sketchy. In many cases, for example noise pollution, indicators have not yet been developed which will allow reliable assessment of potential impacts (Australian Environment Council 1988). The problem is compounded by the interaction of agents which may potentiate each other's effects, and by the long lead-time before some health effects become apparent. Some of the difficulties in conducting risk assessments and the inherent limitations of the process are discussed below.

Major models used for risk assessment

Canadian model: The application of risk assessment in Canada has been described using a chemical hazard as an example (Health and Welfare Canada 1989). The chemical may be identified as hazardous through case reports, toxicological studies, and/or epidemiological investigations. The prediction of toxic or carcinogenic effects on the basis of the molecule's active groups, stereochemistry, or electrochemical properties, may also aid in identifying the chemical as a hazard. The risk it poses is then estimated. Estimates rely frequently on quantitative analysis of epidemiological and toxicological data as well as on assumptions or data about routes and levels of human exposure. These analyses and assumptions are often incomplete and understanding of the relevant biological, chemical, and physiological processes is limited or in some cases non-existent. Mathematical models used to extrapolate dose-response information have clear limitations especially when projecting low-dose human responses based on high-dose animal studies.

After the risk has been estimated, options are developed for dealing with it (risk management). These may be regulatory (new regulations), self-regulatory with compliance monitoring or non-regulatory (economic measures, advice). One option may be to leave things as they are. Options are analysed from a number of perspectives, depending on the particular hazardous materials or circumstances involved:

- Health risks may be weighed against health benefits through scrutiny of the uncertainties in the risk estimate or the application of principles such as the best economically practical available technology, the 'as low as reasonably achievable' principle, or de *minimus* (the risk is so small as to be negligible, and can be discounted).
- The issue may be considered from an individual or societal perspective.
- The public's perception of risk is taken into account.
- The feasibility of the proposed options, including their economic and/or environmental impact is considered.
- The social, political, and cultural implications of each option are studied.

USA model: The risk assessment process adopted by the United States Environment Protection Agency encompasses similar processes to the Canadian model. It involves four stages (Russell and Gruber 1987):

- Hazard assessment: Evidence is examined to find the association between exposure to an agent and its toxicity, and to produce a qualitative judgement about the strength of that evidence, depending upon whether it is derived from epidemiological studies or extrapolated from laboratory animal data.
- Dose-response assessment: The quantitative relationship between the experimentally administered dose of a toxicant and the incidence or severity (or both) of a response in test animals is examined, and inferences are drawn for humans. The presumed dosages and incidence of effects in human populations may be used in cases where epidemiological data are available.

- **Exposure assessment:** Exposed populations are identified, and their composition and size described; and tie routes, magnitudes, frequencies and durations of exposures are examined.
- **Risk characterisation:** Policy-makers are presented with a synopsis of all tie information, an evaluation of the magnitudes and uncertainties involved and the major assumptions made. This is particularly important m understanding what risk assessment can and cannot achieve.

Given the information derived from tie risk assessment procedure, the decision-maker can develop a risk management strategy (Russell and Gruber 1989).

WHO model: The WHO model follows a similar set of steps but recommends a preliminary estimate of likely significant effects at the screening and scopmg stage. In the risk assessment phase more comprehensive predictions are required to give more information on important effects and to define suitable mitigation measures. The steps in estimating magnitude of effect involve predicting the changes which the development will bring about in:

- environmental factors which have health impacts;
- human exposure to those factors; and
- total mortality and morbidity, and risk to high-risk groups (eg infants and elderly people).

The predictions are then used to define the significance and acceptability of adverse health impacts.

The WHO model emphasises the need for social data such as the combination of census data and details of land-use distribution in order to assess the potentially exposed population. It emphasises the need to determine not only the consequences of exposure to a hazard in normal operational circumstances but also the probability and consequences of accidental hazards. Environmental health impact analysis should cover not only the planning, construction, operation and decommissioning of a project, but the accidents or disasters which may arise during its construction or operation and the provision for post-closure maintenance (Giroult 1988).

Sources of uncertainty in risk assessment

Assessing the impact of environmental health parameters on mortality and morbidity requires a knowledge of dose-response relationships. Sometimes these involve relatively simple linear relationships; frequently, however, the relationship between dose and effect is more complex and poorly understood, particularly where multiple and long-term chronic exposures are involved (Giroult 1988).

A series of workshops held in Canada on health risk assessment identified a number of difficulties (Canadian Public Health Association 1990):

- Environmental factors can have multiple effects and cause additive, synergistic or antagonistic effects.

- There is increasing concern among scientists and tie public about tie effects of low-level, long-term exposure to a combination of agents which reach the human population through a variety of routes, including air, water and food.
- Perceived risk can create individual and community stresses, even when the objective risk is negligible.
- Research needs to move beyond traditional scientific approaches which assume that a predominant cause is usually responsible for a predominant effect. Multifactorial causation is increasingly being identified m epidemiology and toxicology, but more complex models are needed.

Uncertainty or other sources of error can yield grossly distorted estimates of risk, and the assumptions and policies on which risk assessment methodologies are based can have a significant effect on decisions (Harvey 1990). For example, a decision to identify a level at which risks are insignificant and exposure would be deemed safe may result in an EIS which offers safe alternatives.

Important factors may be omitted from analysis; for example, tie effects of indirect exposure, changing demography and individual differences in susceptibility to carcinogens.

The appropriateness of criteria used for risk assessment should be examined. One case study reviewed by the New South Wales Department of Environment and Planning (1983) contained a risk analysis for an LP gas storage facility which compared deaths per million of population for this type of industry with smoking and traffic accidents, but which ignored potential morbidity. Yet morbidity (eg bums) from even small accidents in such a facility could be serious, extensive and expensive.

Risk assessment for toxic chemicals is particularly problematic with considerable controversy existing about their health effects. Available research is often inconclusive (Stockdale 1988). It is clearly ethically unacceptable to establish human toxicity experimentally, so the only data available are from epidemiological studies, experiments with laboratory animals and basic research aimed at increasing understanding of physiological processes. Each of these approaches has its own problems. For example basic physiological data are currently available for only a small proportion of chemicals in use — the World Health Organization estimates that over 60,000 chemicals are in common use but requisite toxicological data are available for less than 10,000 (WHO 1987, p. 40). While epidemiology can establish relationships between chemicals and human health problems, it does not, alone, establish causality. Care is thus needed in generalising from epidemiological studies. Experiments with laboratory animals can be criticised on two grounds. First, it is argued that toxicity for laboratory animals cannot be generalised to humans without significant asumptions. Second, dosages to which the animals are exposed usually do not accurately represent likely human exposures.

Molecular epidemiology — a fusion of epidemiology and toxicology — holds promise as a predictive tool that can deal with low-level exposures to multiple agents in human populations. This new discipline focuses on 'bio-markers', markers of biochemical changes intermediate between gross (clinical) effects and tissue-level effects. Biochemical changes may not often prove to be direct indicators of human health effects, and often they may not be agent specific, but they may prove useful as an early warning system and as indicators of exposure before any adverse human health effects develop (Perera et al 1991).

Given the deficiency of the available datasets and the uncertainty associated with many of the data which are available, conclusions about relative risk are likely to be unreliable and will depend in large measure on professional judgement. In the absence of complete data such judgements must be guided by knowledge of the likely impacts on the geographical area affected by it and the length of time over which it is caused, recognised and mitigated. While some pollutants, for instance, pose an immediate risk, the chronic health effects resulting from air or water pollution may become apparent only after many years of exposure; and some pollutants can persist in the environment and pose environmental risks indefinitely. For example, the problem of elevated ambient levels of radon may be limited to the basement of some homes, while depletion of stratospheric ozone affects the entire globe. Some global problems, such as the loss of genetic diversity, can be caused by human activities in relatively limited geographical areas. Long-term and widespread environmental problems should be considered relatively high-risk even if data on which the risk assessment is based are somewhat incomplete and uncertain (USEPA Science Advisory Board 1990).

One of the greatest difficulties in risk assessment involves value judgements. For example, are health risks to the aged perceived to be more or less serious than health risks to infants? Comparing risks posed to human populations with risks posed to ecosystem may be even more difficult. Subjective, socially determined and probably culture-specific values will always influence this ranking of environmental risks, no matter how sophisticated the technical and analytical tools become. Decision-making is rendered even more difficult by the present serious limitations of those technical and analytic tools. The case of the Western Freeway Bypass Health Impact Study illustrates some of the difficulties (See Appendix 2).

The unavoidable uncertainty inherent in risk assessment makes it important that each assessment include a clear statement of the assumptions and uncertainties inherent in it. Harvey (1990) has suggested minimum conditions for reporting data where information relevant to risk assessment is incomplete or unavailable (Box 4.9).

Dealing with uncertainty

- Assumptions and scientific judgements should be stated clearly.
- The nature and magnitude of uncertainties must be delineated.
- Risk assessment and risk management should both be addressed.
- The choice of a particular risk assessment methodology over alternate methodologies must be explained.
- Risk estimates should be presented to afford comparison of risks.
- The role of risk assessment in decision-mating should be specified.
- The agency responsible for decision-making should be clearly identified and publicly accountable.

Box 4.9

Step 5: Risk management

Can risk be avoided or prevented?
Are better alternatives available?
How can benefits and risk be 'costed'?
How can differing perceptions of cost and benefit, nature and magnitude be mediated?
Will predictions of future health risk be robust enough fo withstand legal and public scrutiny?

Risk management is the process of forming and implementing a strategy for accepting or mitigating identified risks. It also involves evaluating alternative options and selecting among them (Brown 1985). It has undeniably political aspects, and will be easier to carry out if it is the culmination of a process which has involved the stakeholders from the beginning. It is essential that information on health impact be public information available in a readily understandable form. Ideally risk management should be planned within the context of regional environmental health management plans (as discussed in Chapter 3.3.2, under Victoria, South Australia and Local government).

The costs, complexities and methodologies of risk assessment, and the extent to which it should influence risk management decisions, remain controversial. On the one hand, risk assessment is now widely regarded by scientists and policy makers as a useful tool. On the other, its technical basis and its 'ownership' by the proponents of a development can generate frustration, suspicion and scepticism among the lay public, and thus make it difficult to negotiate acceptable levels of risk and options to manage risk. One reviewer concluded that what people 'will regard as being "safe enough" depends a great deal on the confidence that they have in the operation of risk management procedures, whether these are applied on

the factory floor or to the complex operations of a large industrial facility with the capacity to injure those who live around it ... It is confidence m management which is at the root of risk acceptability' (British Medical Association 1990, p. 242).

Risk management must take into account three concepts of risk:

- actual risk, which cannot be known with certainty until it has manifested itself;
- statistical or calculated risk, where attempts are made to predict, quantify and compare risks; and
- perceived risk, which may be significant even when statistical risk is de *minimus*.

Standard approaches to environmental risk generally reflect technocratic (statistical risk) rather than democratic (perceived risk) values (Fiorino 1990a); however increasing emphasis is being placed on community perceptions and values and this has generated an urgent need to develop and evaluate mechanisms for involving the public in risk management decisions.

Improved technical analyses and communication of 'correct data' alone are not sufficient. For example, while the credibility of science and scientists is no longer unquestioned by the public, the ability to set scientific agendas and to influence awareness and interpretations of scientific findings remains an important source of power which may be exploited by any of the stakeholders (Harvey 1990). Proponents m y fail to highlight uncertainties and potential risks **m** their impact statements; opponents of development may substitute health concerns into the debate to reinforce amenity concerns which may be seen as less legitimate reasons for opposition.

If public participation in risk management is to be effective, the affected community must be consulted early and genuinely and provided with adequate support and intelligible informtion. These activities are generally considered under the rubric of 'risk communication'. Box 4.10 lists some of the problems which arise in the process of risk communication, as identified by the then Chair of the Victorian Social Justice Consultative Council (Mary Crooks, Personal communication 1991) and highlighted in the report of the Victorian Powerline Review Panel.

Community participation and risk communication are discussed in Chapter 5.2.

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Obstacles to public participation in risk management

- Inappropriate avenues and forums for public dialogue.
- Poor communication between public utilities, government agencies, local councils, and community organisations.
- Constraints on shared and credible information between technicians, other experts and the lay public.
- A lack of fair and evaluative community education, unhelpful levels of simplification, confusions and possibly even misrepresentation of technical and scientific data and debate, use of jargon, alarmist media reporting.
- The creation of an adversarial climate which mitigates against collaborative efforts for problem solving on questions of risks and their management.
- Little collective wisdom about effective methods for imparting information, especially through planning and consultative processes.
- Information which is fragmented or scattered across institutions — government agencies, community organisations and academic departments — making it difficult to access. (Perceived and actual commercial in confidence constraints may also inhibit proponents from full information disclosure.)

Box 4.10 (Crooks, personal communication)

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Mitigation measures

Significant health or safety hazards may be mitigated in various ways, including design changes, or modification of major exposure pathways (Giroult 1988). The most appropriate form of risk reduction will depend on the nature of the concerns. Major hazard control for example, requires measures which are different from those required for waste management or occupational health and safety. In considering mitigation measures, HIA will also need to consider:

- health services and infrastructure;
- the special needs of workers and any particularly vulnerable groups within the population;
- public health education;
- training of health personnel;
- emergency response plans; and
- public health surveillance systems to monitor effects of projects during and after implementation.

Box 4.11 summarises the main strategies available for mitigating potential effects.

Mitigation **measures**

Risk can be reduced or avoided by:

- Modification of:
  - land-use planning;
  - proposal;
  - environment;
  - exposure; and
  - effects.
- Mitigating effects (including compensation).
- Formulating or developing:
  - emergency procedures for acute exposure;
  - contingency measures to facilitate detection and timely response to potential problems;
  - site-monitoring mechanisms to address project closure, risk removal and environmental restoration; and
  - control measures aimed at building public confidence and trust in the approachtaken to project management.
- Incorporating in project approval conditions:
  - recommended modifications; and
  - criteria and methodologies for health impact audits.

Box 4.11

Separating residents physically from sources of environmental health risks, particularly in the urban environment, is an important way of mitigating potentially harmful health effects. For example, given that certain types of air and water pollution and accident sources are active only over a limited distance, urban developments can be made intrinsically 'more healthy' by including environmental health considerations in urban development planning, preferably at the earliest stages, and establishing procedures for consultation between planners and health experts (WHO 1985).

Economic incentives are also effective. Emission rights, compensation policies and enforcement measures are considered in more detail below, under Step 6.

4.4 Implementation

Step 6: Decision-making and implementation

Does the assessment provide sufficient, valid and reliable information for decisionmaking?
Is there a conflict to be resolved?
How will conditions be enforced?
How and by whom will impacts be monitored?
How will post-project management be resourced?

In EIA, the options open to decision-makers (usually government agencies) are to:

- implement the project as proposed;
- design measures to be incorporated into the proposal to prevent or minimise undesirable effects (mitigation measures), or to optimise potential benefits;
- choose an alternative development to achieve the same basic objectives with less impact on the environment and health; or
- not proceed with the project.

The choice is usually not clear cut, and the development which eventuates may be a compromise between a number of options, each with certain advantages and disadvantages. Often there is no alternative other than to proceed (with or without mitigation measures) or to abandon the project. In the case of urban developments or redevelopment projects, the social needs met by the project may outweigh its adverse environmental or health effects.

The aim of E&HIA is to provide the decision-maker with the best possible information on environmental health effects of the proposed development, and on the possibilities for preventing or mitigating these effects.

Enforcing compliance with development conditions

A number of instruments are available to enforce compliance with development conditions. Problems arise more in relation to lack of satisfactory mechanisms for measuring compliance with those conditions. E&HIA should specify conditions and criteria for compliance. Human health indicators should be used where they are available in addition to more traditional criteria such as point-source emission limits.

Environmental health impacts are regulated through statutory measures and common law rules. The following legislative measures relate to assessment of environmental health risk:

- EIA legislation;
- pollution control exerted largely through the licensing of individual sources of pollution;
- regulation of hazardous substances and hazardous sites; and
- occupational health and safety legislation. (Fowler 1991)

Fowler describes the philosophical shift which lies behind the trend towards preventing pollution rather than simply controlling it and the 'precautionary principle' which supports decisions which err on the side of caution where outcomes are uncertain. Given that scientific uncertainty is frequently the only certain feature of environmental health risk assessment (as discussed above m section 4.3), the process of setting standards and development conditions becomes intensely economic and political. While the precautionary principle m y still seem to offer more long-term security, it has potential problems which can be ultimately detrimental. The *United States Superfund Act* for example is aimed at cleaning up contaminated sites, but critics claim that if the chemical danger level had been scientifically determined rather than set at an idealistic 'precautionary' level (defined as 'soil sufficiently clean so that a well producing potable water could be dug in the middle of it'), approximately 90% of important sites could have been cleaned up by now, rather than the **3%** which has been achieved since 1980 (Koshland 1991).

Guidelines based on thresholds for actual damage to health, where these can be identified, are likely to open more options and be less restrictive than guidelines based on tie precautionary principle. The recently published NHMRC *Guidelines for the Rehabilitation of Contaminated Land* provides health risk assessments for specific pollutants which can be used as criteria for clean-up.

Incentives to prevent rather than control pollution remain a high priority. While control mechanism such as the 'polluter pays' principle or the trading of emission rights within defined regions contribute to a prevention ethic, polluters can pass costs on to consumers and taxpayers so that these mechanism do not provide sufficient incentive to re-examine practices and invest in cleaner technologies. By contrast, where standards are progressively revised as a result of technological innovation and updated data on health impacts and on regional and global carrying capacity, compliance can be made a condition of relicensing and this can achieve a progressive improvement in practice.

In many areas pollution licences reflect a conflict between the stated policy objectives and those policies actually pursued (Mobbs and Dickinson 1991). Current New South Wales pollution laws for example, prohibit pollution but they allow it to be licensed for existing industries.

One of a project's most significant impacts may be the condition and use of its land after the project is complete. There is currently considerable concern over use of land which has been contaminated in the past by mining activities, waste disposal or industrial use. Project closure is thus an important consideration in any E&HIA.

In the mining industry, bonds may be required before mining can commence. These are maintained by the relevant government against the cost of rehabilitation. Because these bonds are in proportion to the extent of land disturbed and can be refunded as rehabilitation proceeds, there is a strong incentive for companies to rehabilitate land as soon as possible. As a result, mine rehabilitation is part of development rather than a post-mining clean-up. Some companies have

concentrated on developing low-impact exploration techniques and new rehabilitation techniques and have cooperated with community groups m rehabilitation projects outside the mine areas.

Projects other than mine developments still require procedures for maintenance after project closure. These are probably best modelled on the mining experience, incorporating:

- a system of bond or insurance to provide funds for rehabilitation;
- incentive to carry out rehabilitation as part of project development rather than post-project clean-up;
- industry-promoted award schemes to encourage responsible behaviour m the matter; and
- cooperation between industry and community groups in developing rehabilitation techniques.

Other legislation-based incentives are becoming evident. Forman (1991) reported that lenders could face criminal action under New South Wales and Victorian law for pollution caused by borrowers, and might also be liable for clean-up. h the face of this threat, banks are rewriting their credit agreements to require compliance with environment licences and permits, and regular site inspections and environmental audits. As a result, Forman reports that an environmental audit — m important component of environmental monitoring — is likely to become mandatory for industrial properties.

Compensation

The following summary of compensation derives from Beckwith's paper on Compensation in Social Impact Management (1991).

Compensation can lessen the impact and hardship which m y result from implementation of a project. It should be employed in addition to, rather than instead of, mitigation measures. It can be used to:

- offset special impacts such as loss of property values;
- avoid litigation;
- redress inequities in siting of facilities which are seen as necessary for the general public good; and
- address residual impacts.

Traditionally compensation has been awarded only after adverse impacts have occurred and liability has been proven. A strategic compensation process in contrast offers packages of compensation and local benefit measures to attract potential host communities for unpopular developments such as waste facilities. This process has been used by a Canadian Federal Task Force seeking a site for a low-level radioactive waste management facility. Sites had to meet a set of minimum envimnmental criteria, and the compensation package was designed to offset the social inequity inherent in one community hosting the facility, and to ensure the community was better off as a result.

Mechanisms are needed to ensure that those who are affected by a development are compensated adequately. This poses a moral dilemma as it acknowledges a violation of the principle that none should suffer from a development at the same time as it attempts to comply with that principle. Trade-offs may be justified by resort to 'the greatest good for the greatest number'.

Compensation offered might include:

- cash payments;
- 'in kind' compensation, eg a new water supply;
- infrastructure improvements, eg health or transport services;
- relocation costs or buy-out; and
- local economic or employment agreements.

Ideally, E&HIA should predict and negotiate compensable impacts. Development conditions should specify foreseeable compensable effects and criteria for assessing them in monitoring and follow-up. Input from HIA is critical in determining threshold levels for compensable impacts. HIA should, wherever possible, specify those threshold impacts which are, from a public health perspective, not acceptable even if a compensation package is attractive to the host community.

Step 7: Monitoring, auditing and evaluation

Is the project complying with its conditions?
How well are those conditions achieving the desired outcomes?
How well is the E&HIA process as a whole achieving its aims of protecting the environment and health?

Monitoring and evaluation are integral components of environmental management, since they reveal the accuracy of predictions and appropriateness of decisions based on E&HIA. Techniques such as environmental sampling, surveillance of a marketed product, ongoing epidemiological studies and evaluation of newly available health-risk information are employed to monitor outcomes, while new information about risks may lead to earlier decisions being reviewed (Health and Welfare, Canada 1989).

Routine monitoring of general health conducted by health authorities can provide a baseline against which to assess anticipated project outcomes.

The majority (80%) of respondents to the survey undertaken as part of this project view current monitoring systems as inadequate to control pollution, much less to assess or protect community health. Problems cited include:

- the inadequacy of monitoring networks;
- lack of information on the synergistic effects of pollutants;
- the fact that many pollutants are not being measured at all; and
- the difficulty, in setting standards, of striking a balance between amenity or subjective criteria and scientific data or biological effects.

There are two processes to consider here:

- Environmental monitoring is concerned with identifying and measuring impacts from developments using repetitive observation of one or more elements or indicators of the environment according to prearranged schedules (Bisset and Tomlinson 1988). These observations are used to test hypotheses about the potential impact of a development upon the environment.
- Environmental auditing measures how efficiently and effectively a project is meeting its environmental and health goals. It can be defined with respect to ten objectives which are quoted in Box 4.12 (Australian International Development Assistance Bureau 1991, Read 1991). These have been categorised according to their impact on the development, the wider environment and the environmental impact assessment process (see below).

Environmental auditing

The term 'auditing' is generally applied in the environmental and social context to the periodic or continuous checking of prescribed conditions or constraints set upon development (Australian International Development Assistance Bureau 1991). In the environmental context, auditing refers to the formal means by which the performance of an environmental management program can be evaluated and adjusted (Margolis 1985). Such a limited definition assumes that an environmental management program has been established as part of a prerequisite for development. Note that the term 'industry' or 'industrial plant' is not used because environmental impact assessments and environmental auditing involve a much broader range of activities, incorporating, for example, tourist development, construction of transportation lines and the building of suburbs.

More broadly, environmental auditing can be defined as the systematic examination of a project and of process performance in satisfying and achieving environmental goals. In order to do this the state of the existing environment and the health of the affected population needs to be assessed to provide a baseline against which compliance with an environmental impact statement can be checked. This baseline can also be used to assess the accuracy of EIS environmental and health impact predictions and the effectiveness of mitigation measures used to reduce the impact of a development upon the environment (Read 1991). Auditing does not end with these objectives; it is not simply another stage in the EIA or E&HIA process, but should be an integral element which provides the ongoing feedback necessary to improve the process and to understand environmental management (Sadler 1988).

Environmental auditing is, in most cases, performed to verify compliance, and is usually undertaken by the developer with the aid of private consultants. In the United States there is also a trend towards 'closure audits' where the termination of any industrial operation requires the removal of hazardous wastes and residues before any real estate can be transferred to a new owner or rezoned (Read 1991).

Objectives of environmental auditing

Objectives pertaining to a proposed development:

- To evaluate the effectiveness of compliance requirements and momtoring for a development, and to recommend changes where appropriate.
- To evaluate the effectiveness of surveillance and environmental monitoring programs and recommend changes where necessary.
- To determine whether the commitments of the environmental impact statement have been implemented.
- To determine whether mitigation procedures are effectively minimising any adverse impacts associated with the development.

Objectives pertaining to the broader environment:

- To determine the state of the environment.
- To further the understanding of impacts by similar developments upon the environment and improve impact predictions.
- To provide early warning of any undesirable changes within the environment that possibly were not predicted in the E&HIA.

Objectives pertaining to the EIA process:

- To determine the actual impacts of a development relative to predicted environmental consequences so as to evaluate the accuracy of the predictions made during the EIA process.
- To improve the design and performance of future projects.
- To evaluate the efficiency and effectiveness of the E&HIA process.

Box 4.12

Environmental auditing in Australia

Within Australia auditing may be inferred in Environmental Impact Statements, but rarely are the broad objectives listed above implemented. Usually some government agency, such as the New South Wales or the Victorian EPA, undertakes what amounts to an independent policing of air and water quality associated with a specific development. Increasingly this involves industry self-monitoring under the supervision of the statutory body. This procedure only checks compliance to licence conditions; rarely is the broader environment considered.

Nevertheless, a recent survey of 1,000 major companies in Australia found that of the 352 respondents 39% had undertaken a formal environmental audit (Coopers and Lybrand 1991). These had been performed because of parent company requirements or internal pressure to enhance an image of cleanliness, or on the basis of legal advice (Coopers and Lybrand 1991). Australian industry appears to be

RESCINDED

aware that environmental auditing — beyond simply compliance with environmental legislation or licence agreements set through tie environmental impact assessment process — will be the pattern in tie future. Collaborative planning between business and environmental agencies could increase tie efficiency and effectiveness of environmental audit.

The Inter-Governmental Agreement on the Environment includes environmental auditing objectives, one of which is to monitor the efficiency and effectiveness of the EIA process (IGAE 1992).

Three States and the Northern Territory have expanded environmental auditing principles beyond simple monitoring and compliance:

- Victoria specifically incorporates auditing in the *Environment Protection (General Amendment) Act* 2989, although this auditing is directed towards contaminated lands and physical risks and hazards (Buckley 1990a). The Environment Protection Authority in Victoria has established waste auditing to identify areas within industry where waste can be managed and minimised (Read 1991).
- In Western Australia environmental auditing has been introduced for canal and marina development (Bailey and Hobbs 1990). The audit prog-ram extends beyond compliance monitoring to check the state of the environment in relation to predictions made in any environmental impact statement (Read 1991). The auditing process also examines the performance of the EIA procedure itself (Bailey and Hobbs 1990).
- New South Wales has not introduced environmental auditing formally into tie EIA process; however tie Department of Planning has introduced procedures for hazard auditing aimed mainly at industries involved in the use of chemicals (NSW Department of Planning 1991). While the New South Wales procedures are site-specific and more aligned to environmental monitoring the auditing allows an industry to improve existing facilities beyond the level at which they were originally designed and approved.
- In the Northern Territory Government the Environmental Assessment Administrative Procedures of 1984 give the Minister of Conservation broad powers to review and assess the environmental aspects of any proposed development and its impact upon the environment, including the accuracy of forecasts of environmental effects (Read 1991). The Conservation Commission is actively researching mechanisms to integrate environmental auditing into the environmental assessment process. Audits have been established, with one of the ultimate aims being to assess the effectiveness of the EIA process. Many of the environmental audits that have been carried out in the Northern Territory have been performed at the instigation of developers as part of their environmental management policies or in response to parent company guidelines.

Problems in environmental auditing

The ten objectives of environmental auditing listed above have not been fully implemented anywhere in the world. Part of the problem rests with the belief among proponents or governmental bodies that acceptance of an EIA or EIS is recognition that a development fully addresses environmental issues and complies with pollution limits. Often environmental concerns terminate with the EIA or EIS, and regular or periodic monitoring of air, water or noise pollution does not assess the quality of the total physical environment — especially if it is not compared with data about pre-existing conditions. The EIA process must include auditing in order effectively to minimise environmental deterioration.

Bisset and Tomlinson (1988) suggest that an EIS should generate hypotheses about a number of aspects related to the impact of a development upon the environment. These hypotheses should include the magnitude of the impact, the probability of its occurrence, and its environmental significance. Auditing should then be directed towards testing those hypotheses. All impact assessments should incorporate a follow-up program of this type, with particular focus on those aspects which the E&HIA has shown to be associated with uncertainty. The follow-up program should check the validity and accuracy of the project's forecast impacts and the adequacy and effectiveness of the implementation measures. Where necessary, it must also develop measures to mitigate impacts which had not been foreseen. (Ministere de L'environnement du Quebec 1989)

The limitations and problems associated with environmental auditing have been summarised by Read (1991) and are listed in Box 4.13. These problem must be adequately addressed before routine environmental auditing becomes feasible and acceptable to industry.

Problems in environmental auditing

- EIAs are generally static documents which fail to make allowance for changes in environmental safeguards, new technology, or knowledge about impacts.
- The techniques for predicting impact vary widely, and those used need to be documented in an E&HIA.
- EIAs are usually viewed as documents approving development rather than documents that should outline steps for environmental management.
- Environmental audits are usually seen as management tasks rather than as exercises providing valuable information for decision-making within the operation of a development.
- Environmental audits require the developer to commit funding and staff to carry them out as an integral part of the normal operation of the development.

(continued)

Problems in environmental auditing (continued)

- Government departments often do not know their responsibilities in environmental monitoring, enforcement or overall protection.
- The approval of an EIA is seldom accompanied by a commitment by the government to encourage audits.
- Environmental audits raise questions of confidentiality of information. Public access is often seen by proponents as providing avenues for criticising the operation of a development.
- Audits often lack a feedback mechanism. Unless the results are fed back into decision-making then the collection of impact information is useless.
- There is no adequate legislation governing the establishment and operation of audits.

Box 4.13 (Adapted from Read 1991)

Finally, environmental audits must be related to the broader environment. The concept of regional air pollution monitoring or water catchment management (such as the introduction of Total Catchment Management Programs for streams in New South Wales) is relatively new in Australia. An environmental audit for a development is of little use if that development is part of a much larger agglomeration of industries whose effects on the local region are neither mutually exclusive nor site-specific.

Problems of this type may be difficult to overcome where political and administrative boundaries do not match those of the air or water catchment. The effects of air pollution in the Sydney region, for example, extend across the Sydney basin and beyond, stretching throughout the coastal conurbation between Newcastle and Nowra, an expanse which includes several air catchments and dozens of local government areas. Without monitoring regional air pollution, auditing of a single development discharging pollutants into the atmosphere cannot be effective. The same problem applies to water pollution and sewage disposal in the Sydney region. On a wider scale, pollution of the Murray River crosses State boundaries. An audit of a development on this river without consideration of what happens both up and down stream would not succeed. The scale of the investigation required is enormous and the range of procedures set up as part of the Murray-Darling Basin Management Plan (Simmons et al 1991) indicates the magnitude of the task. Such regional monitoring is clearly a government responsibility, although licensing and development approval conditions could incorporate cost-sharing arrangements.

Health auditing

Environmental auditing is usually concerned with the natural environment. While it includes monitoring of air and water quality, it implicitly emphasises effects on flora and fauna and gives little consideration to environmental effects upon humans. One of the most recent and complete documents on environmental auditing produced by the Australian International Development Assistance Bureau (1991) for instance, discusses the 'human environment' but does not address health specifically.

Environmental auditing should include health auditing whereby the health status of the general public is assessed at regular intervals and compared with the health of that population before development. Health auditing is particularly relevant where development or the continued agglomeration of development could affect an established nearby population. Many difficulties arise in assessing the health of populations, identifying changes in population health and attributing those changes to the impacts of regional developments. Public health surveillance measures will need to be improved significantly to permit health auditing.

Langley and Saadi (1991), in a discussion of health monitoring of populations exposed to contaminated sites, identify the core problems:

> **Subtle effects may only be able to be determined on a group basis ... Problems of causation relating to individual findings rather than group findings arise if the putative effects are common in the general population eg headache, fatigue. Health effects are rarely as specific to an exposure as chloracne with PCB exposures. (p. 19)**

Health monitoring is recommended currently only where environmental or biological monitoring indicates a significant risk of effects; for instance, renal function tests are indicated if cadmium levels are above levels of concern. Biological monitoring has limited application: it measures the uptake of contaminants, or their metabolites, and people's individual responses to them, and is most useful in monitoring chronic exposure to substances with long biological half-lives. The only substances suitable for biological monitoring are lead, cadmium, arsenic, mercury, polychlorinated biphenyls (PCBs), organochlorine pesticides and organophosphorus pesticides.

The Earthwatch Global Environment Monitoring System (GEMS/Air 1991, pp. 18–19) points out that monitoring of the health effects of air pollution is governed, in most countries, only by general air quality guidelines which fail to take account of the wide variations in sensitivity found between different individuals and sectors of the population. Most international, WHO and national air quality guidelines also fail to address synergistic effects of multiple pollutants. The problem is further complicated by the fact that air pollution affects human health not only through direct inhalation but also through water and food contamination, hand-to-mouth soil contamination and dermal absorption. Improved methods are being developed to assess this total exposure. GEMS/Air also reports that in order to produce comprehensive assessments, other data need to be incorporated such as traffic patterns, fuel use, urban topography, meteorology and population distribution and sensitivity.

Health auditing or monitoring of health impacts must be regarded as a research enterprise as well as an attempt to evaluate E&HIA and specific developments. The existing knowledge base and methods in the field are at a very early stage of development and all available data should be harnessed to build national and international capabilities. The responsibility for health auditing clearly extends beyond the proponents of specific developments. In some cases approval conditions may specify their specific responsibility but the background responsibility for health auditing rests with the public health authorities. Priorities for attention in environmental health are discussed in the National Health Goals and Targets promulgated by the DHHLGCS in 1993.

Objectives which should be addressed by health audits are summarised in Box 4.14.

Objectives pertaining to health impact audit

- To determine the health status of a population affected by a development.
- To further the understanding of the impact of similar developments upon people's health and improve the prediction of these impacts.
- To provide early warning of any undesirable changes in people's health that were not predicted in the E&HIA.

Box 4.14

4.5 Conclusion

If health considerations are to be effectively integrated into the **EIA** process, multi-sectoral involvement in planning and assessing each step in the impact analysis are essential. Scoping teams or consultative committees need to be convened **m** the earliest stages to guide the planning of the development and identify key issues to be addressed by the **EIA.** This will facilitate consensual rather than confrontative approaches to decision-making and development. Access to baseline data on public health before development needs to be assured so that the impacts of the project can subsequently be evaluated and the capacity to monitor environmental impacts on health on a national basis is improved.

Risk analysis involves both the technical procedures of quantitative risk assessment and the social processes of negotiating criteria for acceptability of proposed policies and developments. To date, most impact assessment has been deficient in its incorporation and assessment of the non-technical components and in its acknowledgement of the methodological limitations of the technical components.

Methods have yet to be refined for assessing the externalities, human and environmental, as well as the monetary costs, and incorporating them into cost-benefit decisions. Methods for ensuring genuine consultation and participatory decision-making with communities are also embryonic. Gaps in the data about

dose-response relationships between specific exposures and identifiable population-health effects are broad and deep, and the capacity to predict cumulative health impacts on either a spatial or a temporal basis is limited.

For these reasons it is critical that risk analyses where commercial confidentiality is not a genuine factor, and follow-up be regarded as 'action research', providing baseline data and refining methodologies for future impact studies.

The effective implementation of health impact assessment policies and methodologies depends ultimately on our ability to develop adequate indicators and measurement methods for monitoring population health. Health impact auditing should be seen as contributing to broader goals rather than simply evaluating the implementation of specific developments. The WHO has taken a leading role in developing methods and databases for health impact auditing, but highly urbanised and industrial countries such as Australia, with relatively sophisticated health care systems, should adopt a proactive role m developing those methods for export.

We are at the very beginning in the development of processes to achieve effective environmental health assessment. Priority areas for development are:

- individual project indicators for specific developments;
- broader-based generic indicators of population health; and
- ways to link health to existing environmental monitoring system.

The ability to recognise, characterise and reverse adverse environmental health impacts is the most pressing issue facing health professionals into the next century. The biomedical scientific model which underpins most of our existing health care services has a contribution to make in the development of biological momtoring technology and early diagnostic warning signals. Similarly, planners, geographers and ecologists must continue to refine their methods for environmental momtoring, and community advocates and groups must continue to strive for effective participatory planning. A new multi-disciplinary set of skills will be needed by all groups to address the problems presented by the need to monitor the impacts of development on human health.

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5 Evolving methodological issues in E&HIA

5.1 Introduction

This chapter outlines key issues and concerns in the implementation of four elements which are integral to E&HIA but are as yet only in the early stages of development:

- community consultation (Section 5.2);
- health indicators (Section 5.3);
- standard setting (Section 5.4); and
- economic considerations in decision-making (Section 5.5).

5.2 Strategies and processes for community consultation

Community consultation enables the community to comment on proposals and development plans. These comments can be used as part of the broader process of social and health impact assessment which also incorporates other indicators of well-being and demographic status. Community consultation may have impacts of its own including 'forcing our political system and planning activities to adapt to new public demands and changing values' (Priscoli 1983).

In principle, community participation and involvement in the development of healthy environments is well accepted. It is, however, difficult to implement. While notable examples of success in specific spheres can be cited (eg Healthy Cities, Neighbourhood Watch, workplace health and safety committees), there remains nevertheless a considerable degree of scepticism about the process among experts, and disillusionment among community representatives.

A recent review of community consultation processes in Australia (Bowman 1991) found that:

> Consumer organisations have been critical of a number of current consultation processes [and]... while committed to the practice of community consultation in principle, government agencies and advisory groups frequently convene public consultations without adequate planning or clear expectations of the outcomes ... As a result community organisations are becoming increasingly distrustful of consultative bodies.

The report suggests some principles and guidelines for effective consultation which are summarised in Box 5.1.

Guidelines for effective consultation

- Risk communication needs to focus on what information is required, and how it can best be provided, to enable the community to make informed choices.
- The community needs to be made aware of, and exercise, its responsibility to influence market forces, and to facilitate health surveillance activities.
- Discrete communities must acknowledge social equity considerations that are broader than their particular community.
- Non-negotiable aspects of a development should be identified early in the process of community consultation. These aspects need to be clear and well substantiated. For example, the need to provide housing for disadvantaged groups in a particular type of location may be non-negotiable, although where and how this housing is provided may be negotiable.
- The community should be informed about the reasons for consultation before groups are invited to participate.
- Target groups should be involved in planning the consultation process to ensure that all parties have a clear understanding of, and are able to contribute to:
  - the proposed agenda;
  - the role of the consultative body;
  - the parameters of consultation; and
  - the expected outcomes of the consultation process.
- Appropriate consultation models should be selected for each reference group.
- Adequate resources should be available.
- Sufficient time and resources should be allowed to develop submissions and feed back recommendations and reports.
- The process should be evaluated to determine whether the community view has been accurately represented.

Box 5.1 (Bowman 1991)

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A variety of methods has been used to achieve community participation in environmental planning and management, although there is no perfect method for ensuring that communities are satisfactorily involved in the process. By its very nature community consultation is resource-intensive. In most cases there will be a need for traditional methods such as public meetings, media discussion, advertisement, and meetings with local interest groups, as well as fulfilling statutory requirements to include community representatives on consultative and scoping committees.

The media could play a more positive role in education on the environment and health. This would help to address the current perception of the media as often negative and responsible for creating an adversarial climate surrounding community health issues and development. The media have at times sensationalised or blatantly misrepresented both sides of the argument and have been manipulated or manipulative in the search for a 'good story'. They have a responsibility to ensure balanced and informative coverage on development and related environmental issues. Balanced statements aimed to educate the community should be presented to the media by nationally respected professional bodies.

As well as non-government organisations the health promotion workforce of regional health authorities and local government offers a potential source of expertise and assistance in developing an informed and environment-conscious Australian public. Many such bodies take a community development approach to health promotion and some are involved with activities such as the Healthy Cities Project. Local and regional health promotion units could be involved in developing municipal public health plans, and could foster cpmmunity involvement in development proposals. This would also help to integrate the work of health and planning authorities. Health promotion staff and local public health unit staff should also be able to assist in assembling baseline data on health and well-being, and m administering and assessing post-project monitoring and evaluation.

Barriers to community consultation include:

- lack of resources, especially time, since community members who become involved are usually volunteers;
- the fact that some developments, such as plant expansion, may not be notifiable to the public;
- a lack of skills or confidence on the part of the public;
- a lack of trust in the consultation process; and
- conflicting perspectives of proponents and communities, which may lead to a reluctance to share information and decision-making.

The problems of community participation have been summarised by Sanderson (1991):

> The most difficult aspect of the process for an agency is the fundamental loss of control it entails. When a problem is seen as a technical one having solely technical solutions, the role of the expert is clear and simple. The recognition of a political component to the process, and of the need for communities to play an active part, puts the expert in a role which requires very different skills and values. Nonetheless, this is what is required as the community becomes more concerned about the links between environmental and health problems, and the issues are increasingly intensely politicised. Quite apart from the fundamental issue of citizens' rights to be involved in decisions which affect them, this is a social phenomenon which agencies will ignore at their own risk.

Sanderson describes an effective consultation as:

> An ongoing relationship ... in which differences in perspective are recognised and acknowledged, and there is an exchange of information and perceptions about the problem, in order to build up a common understanding of problems and solutions ... [and]... one which is inclusive of all of the affected people, and which uses strategies that ensure that all who wish to participate in the consultation are able to do so.

A series of workshops sponsored by the Canadian Government outlined the socio-political aspects of community involvement and recommended strategies for its enhancement (Canadian Public Health Association 1990a). The Canadian recommendations apply equally in Australia. The workshops noted that the role of public interest groups requires explicit consideration, partly because of the profusion of groups and different perspectives. Major well-funded interest groups like Greenpeace, multi-issue national or regional groups, and small single-issue local groups all represent legitimate but sometimes discordant views. Also complicating the picture is the recent adoption of 'environmentalism' by political leaders of all persuasions. Concern about the short-term outcome of the next election was seen by Canadians to be the greatest barrier to politicians' creative participation in the EIA process, which is geared to the long term. It was thought that, ideally, politicians should provide leadership by directing attention to larger societal issues, by expanding the policy and planning time horizons and by interpreting the EIA process to the public. They could also do much to transcend jurisdictional issues.

The Canadian workshops saw the media as often reactive and sensationalist. They recommended that the media ideally should be more responsible and balanced, they should do more thorough research, presenting all positions on an issue, and they should document successes. That the media are driven by marketing concerns was seen to be a barrier to such attitudes; but the workshops also suggested that a shortage of experienced environmental reporters is a major problem. Recommendations for forming a positive relationship with the media included building an ongoing relationship; earning credibility by being available and speaking in a balanced, well informed fashion; presenting issues to the media at the correct time (delays, for instance, may lead to accusations of a 'cover-up'); developing guidelines for risk communication; and understanding the audience.

The workshops discussed the proponent's role in **EIA.** The stereotypic proponent sees public consultation as a necessary evil, on the assumption that the proponent's cheapest course (from an economic perspective) is to provide a limited one-way information flow to the public. This, however, is not necessarily the case: even the smallest groups have the ability, if well organised, to intervene **m** the **EIA** process and threaten the success of a proposal by questioning procedures and expertise. **A** collaborative approach, effective communication with the public, and involving them in the decision-making process, are increasingly recognised as cost-effective measures.

At present the consultants for a proponent are generally technical experts. The Canadian workshops noted that consultants are rarely health professionals, and since they are employed by the proponent, they are perceived to be reluctant to highlight information that is less than positive. This does little to promote trust, effective public involvement, or meaningful examination of all technical issues and concerns, including human health. The consultant's mandate from the proponent is central. Were the proponent to direct the consultant to communicate freely and early, and utilise consultants with skills in public communication, issues would emerge earlier in **EIAs** and be dealt with more effectively.

Government **EIA** staff are also technical experts, in both the **EIA** process and **m** the various specialties needed to deal with environmental issues. **A** key concern raised m the Canadian workshops was that technical experts often assume that we c m dominate nature, an assumption well established in both our values and our behaviour. The emerging concept of sustainable development was seen as offering an alternative perspective.

5.2.1 Risk communication

The main problem that occur in risk communication are:

- community participation in administrative decisions typically occurs too late, after the regulatory agency and proponents have narrowed the range of possible choices; and
- there is very often a conflict between scientific judgements and value judgements.

Research on communicating risk has focused mainly on the flow of information from administrative authorities and experts to the public, stressing 'how experts inform others about the truth' (Fiorino 1990a). This approach is exemplified in the application of the Seveso Directive in Europe. Two approaches have been used: 'active' provision of information through, for example, letters, leaflets, or personal visits; and 'passive' provision by posting licensing documents in a central location. **A** review of practice found that the information provided was often in a form unsuitable for lay people and the Directive was subsequently amended to specify the content of the information to be provided. This would include, for example, a simple explanation of the activity carried out at the site, the names and harmful characteristics of the substances involved, the potential effects of major accidents, the details of warning systems, and the ways in which information would be provided during the course of an accident (Otway and Amendola 1989).

Such approaches fail to recognise, however, that regardless of the objective or quantified risk assessment, the public judges risk subjectively, with moral, economic and political factors all contributing. Mechanisms need to be established for discussing both value differences and technical information, in order to avoid polarising groups with different perspectives. A model similar to the one developed by the Western Australian Social Impacts Unit is recommended to minimise irreconcilable differences.

If proponents and affected communities work together in the development of proposals from the earliest stages, there is a greater likelihood that technical and value-driven considerations will be integrated.

Occasionally experts will encounter community views which they regard as ill-informed, prejudiced and unscientific; and they may regard community involvement as a vehicle for imparting the 'right' information to the public who will thus come to share their views. This approach is no longer acceptable to the community. The legitimacy of the 'lay' position as well as the 'scientific' one must be recognised and acknowledged (Auer 1989). The Brunswick to Richmond Powerline case (Appendix 2) illustrates the difficulties generated by failure to acknowledge and address sufficiently the legitimacy of public concern.

The conflict between conclusions based on 'fact' and on values is not often acknowledged. Honest and informative disclosure of the uncertainty or inadequacy of data in an EIS is central to public confidence in the process and the outcome (see case study, Victorian Powerline Review Panel — Appendix 2). The predominantly technical nature of the EIS process and the rules of evidence of legal appeal processes tend to focus on those disputes which do occur on scientific issues. The real debate, however, often concerns value choices. While opposition to a project may be rooted in amenity values or perceptions of acceptable risk rather than scientific evidence, the different assumptions about safety and risk are often not articulated because a discussion of values is often seen as emotional and therefore not legitimate (Harvey 1990). The health aspects of the powerlines dispute were brought into a debate which focused initially on aesthetic considerations, possibly because health was perceived to be a more legitimate cause for objection.

Public acceptance of risk is determined by cultural, socioeconomic and psychological factors, as well as the nature of the risk itself. In general, people are less likely to accept risk which is involuntary, unfamiliar or potentially catastrophic, or which results in particularly emotive outcomes such as diseases in children. Risk predictions are cited as statistical probabilities, which most people find difficult to understand. Public attitudes toward chemical hazards frequently diverge considerably (in either direction) from probabilistic risk assessments made by engineers and scientists (Lee 1986). Public perception of risks has practical as well as social implications since public agencies and legislation in democratic societies are driven by public concerns, and environmental laws are shaped more by public perceptions than scientific understanding of risk. This can result in environment and health agencies' resources being directed towards those environmental problems perceived by the public to be most serious, at the expense of those environmental problems that pose the greatest objective risks. Clearly it is

necessary to increase the public's understanding of the scientific and technical aspects of environmental risk while simultaneously improving the experts' understanding of the basis and legitimacy of public concern.

Improving risk communication will involve social and behavioural research, better access to existing toxicity data, education of the public and health professionals in relative risk and risk communication, and community involvement m determining acceptable levels of risk. Given the differences in power between the various potential contenders in such a discussion, structural mechanisms will need to be established to support less powerful groups. Conceptual and practical frameworks to empower the community must be developed, and common ground must be found between the findings of experts and the perceptions of lay observers, within a framework that embodies both social justice and the legitimacy of subjective community knowledge. Increasingly, the process becomes one of defining that common ground.

Some key considerations in risk communication are listed in Box 5.2.

Key considerations in risk communication

- Ensure the nature and extent of the risk is understood by stakeholders.
- Involve local government, interest groups' and the broader community in early and ongoing consultation.
- Provide information which is 'user friendly', comprehensive and balanced.
- Ensure access to resource people to interpret technical aspects of health data and to assist community analysis in areas of uncertainty.
- Identify early warning signals for significant health impacts of chronic exposure.
- Agree on regular studies to monitor health impact.

Box 5.2

5.2.2 Community involvement in monitoring of health impact

it was noted in Chapter 4 that the scoping process and guidelines for the E&HIA should include a definition of agreed criteria for monitoring health impacts.

Community involvement in monitoring currently operates informally, with observed pollution incidents usually prompting public complaints to pollution control authorities. More serious incidents, such as the Coode Island chemical fires in the Western suburbs of Melbourne during August 1991, prompt more serious responses from the public and the media. This post hoc complaints mechanism achieves some results: in the case of Coode Island it resulted in the establishment of a Review Panel to examine the operations of the Coode Island facility and the adequacy of the State's preparedness to respond to such emergencies.

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The Coode Island fires drew attention to the need for proactive community involvement. Much of what the Review Panel recommended in that regard has been advocated in this report as standard practice for HIA, and is presented in Box 5.3. The Review Panel emphasised the need for better access to information in an understandable form, to allow people to participate in planning and monitoring hazardous facilities.

The community's cooperation is needed in order to carry out any data-gathering exercise, particularly if it relates to the health of members of that community, as health monitoring may require access to more qualitative information such as descriptions of social networks, cultural practices, beliefs and concerns, in addition to clinical, epidemiological and health status surveys. Collection of such a range of data will require a broader set of skills than most health, environment or planning bodies currently possess, as well as a more creative use of resources.

Involving communities in planning and monitoring chemical storage facilities

- The community has a right to know; their information needs must be considered, and mechanisms for disseminating information must be in place.
- The community must be able to have input into statutory processes including planning approvals, licences and emergency plans.
- Forums are needed for mutual discussion and education between industry, government and the community.
- Mechanisms should be developed for the community to independently monitor the performance of a facility in relation to health and environmental impacts.

Box 5.3 (Adapted from Coode Island Review Panel Options Paper, p. 117)

5.3 Identifying indicators of public health and well-being

The ability to identify potential health impacts, to carry out follow-up evaluation and monitoring, and to analyse resulting data depends on having suitable indicators or criteria which define health, ill health and health outcomes. Indicators are particularly important where health impacts are likely to be complex, cumulative and multi-factorial.

The most appropriate indicators will depend on the nature and extent of the problem, the purpose of evaluation, and the resources and skills available. The following general principles apply across the spectrum of biological and social sciences:

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- E&HIA should address low-impact effects as well as the acute toxic effects which result in clinically recognisable disease. Because the relationship between exposure to environmental hazards and health outcomes is complex, multi-factorial, and often involves long latency periods, some effects which may be subclinical or even subliminal may have significant cumulative or social impact.
- Specific health parameters need to be identified and measured m order to monitor the ongoing impact of any approved developments. To estimate population baselines for some public health problems, it may be necessary to utilise national, State or local data banks which currently provide insufficient information, but as the Australian public health infrastructure improves (eg see Rubin et al 1990) these databases should become more complete.
- Given the very incomplete understanding of the health consequences of environmental change, epidemiological vigilance must be maintained. This will require biological markers of exposure to indicate where more m-depth quantitative risk assessment is needed (McMichael 1990), and social and functional markers of population health (eg crime, delinquency) to indicate when a community is experiencing deleterious effects.
- Quantitative risk assessment requires an assessment of likely exposure. Dispersion modelling and pathway analysis will involve chemical, ecological and geographical studies of distribution of toxic biological and chemical substances in air, ground and water. In addition, studies of tie habits and behaviour of populations which might be affected will be needed to predict their level of exposure and to identify relevant social and economic indicators. This will entail anthropological and sociological research both to identify likely exposure routes and to establish baseline data for monitoring social effects.

In active search for indicators of public health and well-being during the past 20 years has yielded few completely satisfactory measures. Inventories of measurement scales, social indicators and health survey instruments are available (for example, see Hunt et al 1986, McDowell and Newell 1987, WHO/IEA 1987, Noack and McQueen 1988, Walker and Rosser 1988).

Specifically health-related data include:

- rates of morbidity, mortality, birth, infant mortality, and specific diseases;
- epidemiological surveillance data;
- indicator disease registries such as cancers and asthma; and
- health service utilisation and health expenditure.

Several categories of social data may also be useful for profiling communities and evaluating impacts, including:

- statistical data, eg census data, household ownership, employment statistics, car ownership, crime rates and education participation rates;
- documentary data, eg media reports, historical documents, government reports and policies;

- observational data, eg participant observation, action research and anecdotal evidence; and
- survey data, eg interviews, surveys, polls, citizen responses and lodgement of objections.

Collecting these data will require the skills of workers in a variety of disciplines and research traditions. Social data are inherently bound to their context and cannot be controlled in the traditional scientific sense. Skills in social science research and analysis are necessary to ensure that data are as reliable and valid as possible and that their limitations are portrayed accurately. Connor (1977) lists 14 data-collection techniques which have been used in social impact assessment:

- demographic analysis;
- evaluative research;
- community studies;
- causal modelling;
- social indicators;
- ethnomethodology;
- archival research;
- survey research;
- institutional analysis;
- value analysis;
- multivariate analysis;
- social network analysis;
- social forecasting; and
- matrix methodologies.

Sources of data and methods of data collection should be adequately documented to assist the development of databases and methodologies.

5.4 Standard setting

For the purposes of E&HIA, standards may be defined as guidelines or limits which dictate acceptable performance levels. The traditional model for setting allowable exposure standards has been described by Lokan (1991) as 'authoritarian and expert oriented':

> In its simplest form, a committee of experts makes an 'objective' assessment of risk or, more commonly, of a threshold exposure, below which there are no adverse effects, and sets up regulatory mechanisms to keep exposures within this standard. A more sophisticated approach is to define a risk coefficient in terms of adverse effects per million persons per unit of exposure, offer a judgement about what risk is acceptable to society in return for the benefits, and set exposure limits and regulatory control accordingly. This ... has in the past provided an efficient process for the setting of

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standards and has proved comfortable for our legal system and acceptable to industry ... because it defines clear rules under which they can get on with their job. Changes m social attitudes ... and a much more direct public involvement in determining ... 'acceptable' risk are making this process much more complicated.

Exposure standards are the product of a 'best fit' decision reached after consideration of the risk assessment data and the social, economic, political and technical evaluation of those data. Because each of these categories of information may change over time and because of the uncertainties inherent m risk evaluation, standards are rarely absolute. They are liable to change as experts and communities re-evaluate the acceptability of the risk, as more information about danger to health becomes available, or as technology which can lower the risk at a cost which the community is prepared to bear becomes available.

Setting exposure standards is made very difficult by the paucity of cause-effect data. There are few epidemiological studies which establish clear relationships between personal exposure to known doses of hazardous agents and health effects. Methods are being developed to measure personal dose and exposure to increased numbers of environmental hazards, and to relate these to health effects and to tissue-specific biochemical changes (eg Human Exposure Assessment Location Project 1986, Berlin et al 1984). For the foreseeable future, however, most standards will need to be based on extrapolations from animal studies and estimates of exposures to pollutants in the ambient environment.

Setting exposure standards based on 'no effect' thresholds has two significant drawbacks:

- there is a considerable imbalance between research effort m different fields; and
- nearly all monitoring is focused on a single medium or a single pollutant.

These problem have been recognised for at least 15 years. Finklea et al (1977), investigating the health effects of sulphur oxides and particulates, noted *m* 'obvious imbalance' between the data available from epidemiology, clinical studies and toxicology. Further, they noted that since 'cost controls are generally exponential ... the uncertainties inherent in the present standards are definitely billion dollar ones'. Most environmental monitoring is governed by specific legislation such as Clean Air, Clean Water or Contaminated Land acts, and thus focuses on single-medium monitoring. The standards set for air, however, may not be easy to relate to those for soil or water, and it is difficult to quantify total exposure for a population, or to plot the interchanges of pollutants between media (Barth et al 1977).

McMichael (1991) has reviewed some of the sources of controversy and uncertainty involved in setting environmental exposure standards, and these are summarised in Box 5.4.

New developments can incorporate appropriate controls to meet current standards (WHO 1985); however where exposure standards are revised, implementation for existing sources of environmental hazards may prove technically impossible or prohibitively expensive.

Standards should be set as a minimum; however a 'best practice' approach, with use of the best available technology, design and work processes is the ideal which proponents should be encouraged to achieve.

Considerations and controversies in setting environmental exposure standards

- Cumulative exposure: the same agent may be encountered via several routes and sources.
- Synergistic effects: interactions between disparate agents may increase risk.
- Safety margins must allow not just for uncertainties but for individual differences in response to exposure and genetic susceptibility which may affect screening, protection and discrimination.
- There are many more exposure agents than resources to evaluate them.
- Setting limits may encourage false confidence and remove incentives to reduce exposure below the designated limit, when risk is still present although diminishing; nevertheless, they are vital for ensuring minimum standards are met.
- Inconsistencies may exist in public policy, eg higher exposure limits in occupational settings than in the ambient environment.
- Exposure data may not be available or may be extrapolated from environmental monitoring rather than personal exposure.
- Especially at low levels, epidemiological data are deficient for relating exposure to health effects. There is a lack of adequate epidemiological data on individual exposure.
- Values differ on what constitutes 'acceptable risk'.
- Scepticism is widespread about the degree of accuracy and validity of quantitative risk assessment.

Box 5.4

Technical standards exist against which some assessed exposures can be compared: for example, international and Australian standards for:

- air, food and water quality;
- acceptable noise levels;
- acceptable daily intakes;
- biological limit values; and
- early warning standards for public health.

Box 5.5 details the considerations which apply in setting standards.

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Setting exposure standards

What is acceptable exposure or risk?

- Identify relevant national and international standards
- Discuss formal procedures and safeguards with local communities.
- Identify local standards — acceptable levels of risk are determined by community values, regional characteristics and economic considerations as well as scientific data.
- Note difficulties defining personal exposure versus ambient standards.
- Incorporate appropriate standards and agreed monitoring protocols into development approval conditions.

Box 5.5

Several authorities are responsible for establishing standards m Australia. They include the NHMRC, Worksafe Australia, and Standards Association of Australia. The constituencies and processes of these bodies vary, for example, tie NHMRC process involves a mix of business, unions, experts and community representatives, Worksafe is a tripartite organisation involving unions, employers and government and SAA involves experts and industry only A wide range of specific guidelines is available and a priority development for E&HIA in Australia should be the establishment of a central database of standards applicable to environmental health. Standards apply to processes as well as products such as emissions; for example, Worksafe is currently developing standards for control of major hazards.

In the context of E&HIA for development approval, standards which apply to the development should be discussed with and explained to the local community via their representatives on the scoping committee. Local conditions which may modify those standards should be identified and where possible agreement to modify or apply existing standards should be negotiated. A checklist of such conditions is proposed in Box 5.6.

Local conditions which may require modification of standards

- Proximity of vulnerable groups, eg groups of children.
- Vulnerability of community, eg present high burden of ill-health or socioeconomic disadvantage.
- Vulnerability of ecosystem, eg wetlands, national heritage areas.
- Geographic characteristics, eg dispersion patterns, vulnerable water supply, stressful climate conditions.
- Total environmental hazard load of the region defined by geographically determined carrying capacity.
- Other regional or local characteristics, as identified in the municipal public health plan.

Box 5.6

Environmental health standards are usually established as part of an ongoing government policy to provide a mechanism for regulating exposure in occupational and ambient environments. Standards may remain advisory, or may be incorporated into local or national law. Technical feasibility and financial implications are taken into account in the adoption of standards, and different values may be applied in different contexts. Many standards deemed to be acceptable in the occupational environment, for example, significantly exceed the levels deemed acceptable for the general population. This is to some extent a cost-benefit decision, supported by data on eight hour exposures m a healthy subset of the population and is reached by unions, employers and regulatory agencies in negotiation. At the level of whole communities, vulnerable populations such as children have to be protected, and the costs can be borne by a broader economic base.

Some conflict arises from the difficulty of setting standards that are acceptable to both the developer and the community. Traditionally, pollution control legislation has been based on standards such as the **ALARA** (as low as reasonable achievable) principle, BEPT (best economically practicable technology) levels, or compliance with WHO or NHMRC guidelines. The assumption has been that the standards, if met, will be acceptable to the community and that the development will not pose an unacceptable risk to the community. It can no longer be assumed that the general community accepts that compliance with occupational health and safety regulations to reduce risk to workers will adequately protect those outside the plant. This applies to noxious or dangerous substances as well.

As communities become more aware of toxic substances **m** the environment, and demand more accountability for development proposals, the definition of standards becomes increasingly reliant on public perceptions and community willingness to pay. However as Sprent (1988, p. 144) points out:

> **On environmental issues utilities and subjective probabilities have an important role, but, because of lack of understanding of many of the factors involved in pollution damage, there are wide variations between different individual and group evaluations of these utilities and probabilities.**

These differences reinforce the need to involve stakeholders throughout the process of E&HIA so that understandings of utilities and subjective probabilities can be shared, reconciled or negotiated to arrive at acceptable standards. WHO emphasises the importance of mechanisms for negotiation and sharing of information across the broad range of community interests in the process of setting standards (de Koning 1987, p. 70).

5.5 Economic considerations in decision-making

Most development proposals have an economic base and a potential economic benefit for some (if not all) of the stakeholders. Comparison of disadvantages or risks imposed by the development therefore also requires that an economic value be applied if possible. The EIA process has usually failed to include the cost of 'free' environmental resources in the cost-benefit equation. In the context of sustainable development, methods are being canvassed for valuing natural assets in economic terms to rectify this deficit (Australian Government 1990). The difficulties are compounded when economic valuation is applied to health, particularly if 'social' as well as physical health is to be included. Evaluation based purely on cost-benefit analysis does not address equity or ecological and social imperatives. Evaluation of health risks requires that the public's perception of risk is acknowledged (if it concurs with the scientific assessment of risk, it should be heeded; if not, then the costs of negotiation to assist shared understanding should be allowed for), that comparative risks (to both physical and social health) of not proceeding with development are considered, and that estimates of monetary costs of health effects, including quality of life, health care costs and opportunity costs, are included.

Cost is an important element, given that risk is a relative phenomenon and that calculation of cost-benefit ratios is therefore inherently unreliable. The cost, either social or economic, which a community is prepared to bear in order to eliminate a given level of risk is a social and political decision, not just a technical one. In the development of EIA, cost benefit has usually been applied only to the industry or development itself and has failed to take account of the cost inherent in any public health consequence which may result. Cost-benefit calculations should be externalised to take account of effects on the population.

Despite the limitations of approaches which attempt to cost human health and well-being the process may clarify the issues and facilitate management decisions. For example, it may be that low levels of risk can be accepted or health risks accommodated through special monitoring and health care provisions for those in high-risk groups, but decisions about the most acceptable and feasible options will be based, at least in part, on the costs of the options.

Economic analysis of options aims to structure and analyse information in a manner that will inform and assist policy makers and planners to evaluate and choose between alternative courses of action. Regardless of the particular technique of economic evaluation chosen — cost benefit analysis (CBA), cost-effectiveness analysis (CEA) or cost-utility analysis (CUA) — all of the costs and consequences associated with the alternatives under consideration must be identified and measured.

The broadest type of comparison is involved in CBA, when all costs and consequences of a proposal are valued in monetary terms. CBA attempts to determine whether the monetary benefits of the development are worth its costs.

Many health impacts, however, are difficult to express m economic terms. h practice, CBA focuses on those impacts that are more easily measured, such as productivity gains (through ability to work) and savings m health care resources arising from improvements in the population's health.

The 'human capital' approach and the 'willingness-to-pay' approach both attempt to evaluate benefits (Tolpin 1988). The former values benefits in terms of the increase in lifetime earnings which can be achieved by avoiding productivity losses. This approach, however, implies that the lives of unproductive individuals are worthless, and it ignores tie suffering of the person involved. The willingness-to-pay approach attempts to value reductions in morbidity and mortality by estimating individuals' willingness to pay to achieve such reductions. This presumes that individuals are fully aware of the nature of the problem and the risks involved.

Cost Effectiveness Analysis (CEA) estimates the costs of alternative courses of action which have consequences or outcomes which can be measured in commensurate units in evaluating health programs: the measure of effectiveness is often the number of life-years saved. The relative costs and effectiveness of alternative programs can then be compared in terms of tie cost per life year saved. In contrast to CBA, this technique does not involve placing a monetary valuation on the outcomes achieved. For example, no monetary valuation is placed on life-years saved.

Both CBA and **CEA** are inherently limited in that modem health care is concerned with improving the quality as well as the quantity of life. Consequently there has been increasing interest in measuring changes in the quality of life associated with alternative developments. This has led to the development of Cost Utility Analysis (CUA), in which quality adjusted life years **(QALYS)** saved are taken as a measure of the effectiveness of alternative developments. **As** with **CEA,** this does not involve valuing the consequences in monetary terms.

In valuing health consequences relative to one another rather than m monetary terms, CUA may offer the greatest scope for consideration of a broad range of costs and consequences.

While it may not be possible or necessary to measure and value all the relevant costs and consequences of the development or activity *viz a viz* other alternatives, it is important that they be identified to minimize the chance that the analysis becomes biased in favour of easily measurable items at the expense of criteria such as indirect productivity losses, improved quality of life, and social costs.

Economic analyses should not be viewed as formulae for making correct project approval decisions but as techniques for generating information to assist decision making. Viewed in this way, these analyses can serve as one of several inputs into the product approvals and E&HIA process (Warner and Luce 1982).

As a rule of thumb, where the issues are complex, and where it is difficult to quantify all of the cost and benefits, policy makers and planners should be cautious in applying the results of such economic analyses (Tolpin 1988).

Court and Butler (1991)have suggested a model for considering economic aspects in the setting of standards. They point out that, in theory, determination of acceptable levels of risk can be made by reference to the risk/cost trade-offand the benefits of risk reduction, such that optimal level of risk can be defined as that probability of adverse health effects above which individuals are willing to pay more to reduce that probability than the cost which must be incurred to reduce it. In practice the risk/cost trade-off is not well established for most environmental hazards and the benefit estimates are subject to a considerable margin of error. An exact point of acceptable risk cannot, therefore, be defined; rather, the possibilities encompass a range of values of risk and it must be concluded that the economic approach has not yet resulted in the rigorous empirical determination of the optimal level of risk. Until this is achieved, alternative approaches to determining 'acceptable' risk must be explored. One alternative is to accept higher levels of risk and provide compensation to those affected (compensation is discussed m Chapter **3).** However, as a general principle this option is unlikely to be acceptable because of its ethical implications and its acceptance of environmental degradation. The other extreme is to set health criteria which are almost certainly 'safe' for everyone in all circumstances and pay whatever the cost. This is likely to remain an ideal rather than a practical solution in most societies. Alternatively, methods need to be developed which allow the explicit integration of cost considerations into the setting of environmental health standards.

5.6 Conclusion

Many aspects of environmental and health impact assessment are characterised by their developmental nature. Those aspects such as quantitative risk assessment for which accepted scientific procedures are better developed assume a prominence m the process which is indicative of their relative methodological maturity rather than their validity as measures of actual or perceived risk. The technocratic evaluation of risk can provide some guidance as to the absolute dangers posed by some developments, but better informed judgement will depend upon the development of acceptable methods for:

- consulting affected communities;
- assessing and monitoring population health;
- determining appropriate standards; and
- evaluating the economic implications of impacts.

Proponents as well as communities will benefit from the development of these methodologies because they will provide routine pathways for the health and social impact assessment of proposals and will render the preparation and assessment of an EIS more straightforward and economical. Successful approaches to each area identified in this chapter should, therefore, be documented and shared so that they can be trialed and refined in other EIAs and ultimately form the basis of accepted standard practice.

Appendix 1

Report of the consultancy process

Terms of reference

The successful contender will be required to:

1 consult with the relevant national agencies and States/Territories, review the appropriate literature and evaluate the current practices m regard to environmental health impact assessment, health impact assessment and environmental impact assessment. It will also be necessary to examine current proposed planning processes which attempt to integrate health and environmental considerations eg Environmental Health Management Planning in South Australia, Municipal Health Plans in Victoria etc;

2 develop a practical framework for HIA in Australia with respect to:

- identifying the scope of HIA. This will include an analysis of traditional potential health hazard parameters (such as environmental pollutants, unsafe physical structures, incompatible land uses etc) as well as newly emerging health hazards, ie. the range of social and economic factors linked with health outcomes;
- identifying potential exposure routes in relation to human activities;
- identifying the processes/mechanisms for arriving at useful and realistic:
  - estimates of health risks including both immediate and potential long-term health effects;
  - evaluation of health risks including comparative risk, balanced risk, and risk-benefit;
  - recommendations on appropriate health risk management;
- recommending a national framework and strategy for implementing integrated environmental health impact assessment m Australia; and

3 formulate, as part of the evaluation strategy, a mechanism for public consultation on the proposed framework.

Methods

The Advisory Committee met once on June 21, and provided advice on consultations to take place in the States.

Staff

Two half-time research assistants were employed to assist with the project.

Literature search

CD and on-line databases were accessed. Databases searched included:

- ABI (Business Management and Administration Information),
- APAIS (Australian Public Affairs Information Service),

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- Envirolinc,
- Medline, and
- NTIS.

Relevant Occupational Health and Safety literature was provided by Dr Gary Baker, Worksafe Australia.

The literature focused mainly on the evolution of EIA and the emergence of health as a related issue. Canada, the United States and to a lesser extent, Europe and developing nations were the main focus of the international literature. Common topics covered included EIA and HIA legislation, procedure, the role of scientific risk evaluation, public involvement in the process and the economics of improving **HIA.**

Survey

A mailing list comprising over 550 individuals and peak groups was compiled and a survey was sent which sought advice, opinions and information relating to existing EIA and **EHIA** practices and desirable alternatives. Over 150 responses were received. The survey was more extensive than proposed in the original tender. The national, multi-sectoral and potentially sensitive nature of the project outcome, however, dictated an inclusive rather than selective approach to the survey. Surveys were sent to all levels of government, industry, professional bodies, community groups, Healthy Cities networks, individuals selected from the ANZECC directory, contacts, academics, Parents and Citizens Associations, members of the NHMRC and the Public Health Association with interest or expertise in environmental health, EIA consultants and ESD working parties.

State visits

Relevant legislation and responsibility hierarchies were identified in each State and members of the project team visited all States between August and November 1991 to follow up information derived from the survey and the literature survey.

Workshop

A workshop for invited participants from all sectors was held at Wollongong University in October 1991.The workshop dealt with questions raised in the survey. Outcomes from the workshop were incorporated into the draft report.

Other relevant activities

- A meeting was held on 18 June 1991 with members of the ANZEC Working Group to discuss a National Approach to EIA in Australia and agreement was reached on a mechanism for integrating the two projects. The question 'What input from the **HIA** project would be helpful to the EIA project?' elicited the following suggestions:
  - guidelines for those in health who advise on the process of **EIA;**
  - a set framework to educate those doing EIAs on what advice is available in relation to health impacts;

- information on the availability of data on the health-related consequences of certain types of activity, and on the priority areas of concern in the health sector; and
- suggested ways in which the health sector can assist in assessing the cumulative impact of development, particularly in urban areas.

- The project was presented and discussed at the National Conference of the Environmental Health Officers Association.

Consultation visits

When the first draft of the protocol was completed, meetings were convened in Canberra, Melbourne and Adelaide to gather specific feedback from health and environment departments. The draft protocol was also presented and discussed at the National Short Course on Environmental Health held at the University of Adelaide where the audience consisted of 40–50 professionals working in health promotion and environmental health, largely drawn from State and Federal Government departments. Feedback from these consultations was incorporated into the draft report which went to public comment.

Draft report

The availability of the draft report was advertised in a national newspaper in May 1992. The report reflected the findings from the literature, survey responses, State/Territory visits and workshops. It was intended to stimulate discussion and identify sectoral concerns and difficulties with the concept of E&HIA so that a more refined framework could be developed.

The two-month period allowed for comments was subsequently extended by a further month. Over 400 requests for the draft were received with a further 2000 copies distributed to government, industry, the community, professional bodies, academics and individuals. Many of these organisations then advised their constituencies of the availability of this report and provided coordinated comments.

Two further workshops were held with community and industry groups to discuss issues of concern raised by the draft report.

Final report

Over 300 responses to the draft report were received and are summarised in a separate document available from the Department of Human Services and Health. The draft was extensively reviewed in light of these comments. The final report is the result of two years of research and multi-stage consultation.

Appendix 2

Issues in Environmental Health Impact Assessment

Australian case studies

Port Pirie, South Australia

The Port Pirie area provides a good example of the way in which the approach to an environmental health problem has changed over time. Initially the focus was occupational health. Lead poisoning (plumbism) among workers at the lead smelter led to a Royal Commission in 1925 and thence to much better control of contaminated dust on site. Fifty years later, CSIRO began to look at lead levels in soil and crops in the area and at the effects of blood levels on pregnancy outcome and child development. This concern for the health of people in the area, rather than just within the works, corresponded with the rise of the environment movement generally and with recognition in Australia and overseas that lead ingestion from sources other than paint was affecting children's health.

By 1983, testing had shown that 7% of children in Port Pirie had blood lead levels higher than 30 mg/dL, the 'level of concern' recommended at that time by the National Health and Medical Research Council. The Pasminco plant upgraded in the mid to late 1980s and the South Australian Health Commission funded a $25 million abatement strategy to evaluate the extent of the problem, decontaminate houses, encourage planting to reduce spread of dust by wind, and educate the community about ways to reduce intake of lead (see Body et al 1988).

The recommended 'level of concern' was lowered to 25 mg/dL in 1987, and lower levels for public health action have been recommended by NHMRC in 1993. The lowering reflects several general trends:

- better analytical methods and studies of associated subtle health problems which have identified health effects at lower levels of some pollutants;
- the difficulty of identifying both the pathways by which contarninants enter the body and subtle health effects. This often leads to disagreement between experts and suggests the need for a cautious approach: and
- the anxiety, mistrust and cynicism which such uncertainties and disagreements breed in the community, leading to the possible rejection of the idea that any exposure at all can be considered 'safe'; and
- greater appreciation of adverse effects on 'sensitive' populations.

In Port Pirie some residents who have experience with the problem of lead reject completely any new industry which will generate waste that may affect health. This can be seen in the responses to a draft EIS for a proposal to establish a plant to process rare earth ore (monazite). The quotations below illustrate the opposing viewpoints (Kinhill Engineers 1991):

> The EIS should address the public's possible misunderstanding of terms such as long-lived radionuclides which, to the ignorant, brand the project as a totally unacceptable

> additional hazard to tie life in the Port Pirie area while doing no such thing to those educated m physics.
>
> The local people are to have no say in this matter but do not want tie project to go ahead as it will m many ways be the death knell of Port Pirie.
>
> People have been subjected to pollution both from BHAS for 100 years and from the old rare earths plant 30 years ago.
>
> On the basis of the various estimates of the content of radioactive materials and the radiation levels being correct, the project with the management systems proposed should have no significant impact on the natural environment, site employees or the general public.
>
> The maximum possible dose (mpd) for radiation workers ... has been decreased by a factor of 25 m fifty-six years (from 500 mSva in 1934 to 50 mSva in 1977 to 20 mSva m 1991) ... and it is probable that [twenty years from now] radioactive substances will be in the same category as blue asbestos — effectively outlawed.

The assessment of the project (Department of Environment and Planning, South Australia, 1991) suggests that if levels are controlled well enough to protect workers, the risk to the community will be negligible. And although 'social and economic impacts' are addressed explicitly, 'health impacts' are merely implied in the assessment of air emissions and radiation risk.

Air quality and resource development in the Hunter Valley, New South Wales

The Hunter Valley illustrates the need for regional or catchment area approaches to pollution control. Air quality in the Valley is affected by pollutants from open-cut coal mining, aluminium smelting, power generation and associated industry and traffic. The levels of pollutants identified are not considered dangerous, but assessment indicates that:

- future acid-gas producing industries should be viewed with caution;
- the interim standard for dust should be reviewed;
- future EISs need to model short-term fluctuations in levels, driven by meteorological changes;
- a central data bank for environmental data is needed; and
- policy options such as emission taxes and pollution quotas should be considered.

Clearly these are issues which extend beyond the scope of an individual proposal and EIS, but which provide the context in which future proposals must be judged (Jakeman and Simpson 1987).

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Western Bypass Health Impact Study, Victoria

The 'Western Bypass' was a project proposed by VicRoads to link the Tullamarine Freeway with Footxray Road. Vic Roads funded first a feasibility study for a health impact study of the project and then the health impact study itself, and the study's conclusions illustrate well the complexities and uncertainties inherent in such assessments.

The affected communities had several high rise housing estates and many residents who could be described as being relatively disadvantaged and carrying a higher-than-average burden of health problems.

The study examined four main health questions: road accidents and injury, traffic noise, air pollution and stress. It carried out a review of literature, expert opinion and community standards for pollutants; it collected and analysed local data; and it predicted the situation in 2001 with and without the Bypass. Community concern was addressed by ensuring that the standards for pollutants had been determined in relation to the health of the disadvantaged and by collecting a considerable amount of local data.

Among the study's recommendations were:

- that the EPA establish goals for traffic noise pollution;
- that a plan and strategies be developed for reducing noise pollution in the area;
- that funding be made available for noise insulation of affected buildings; and
- that a community consultative committee be established to examine noise abatement if the Bypass is built.

The authors of the study concluded that:

> **It is difficult to arrive at an overall assessment of the health impact of the proposed Western Bypass. The health picture is quite complicated: different areas would be affected in different ways, and in any one area there might be some health benefits and some increased health hazard ... There are also many uncertainties; for example what traffic volumes would actually be in ten years' time, and whether measures to make the proposed Western Bypass 'as healthy as possible' would be carried out ... Since it is difficult to come to general conclusions, community members need to make their own judgements. (pp. 14–15)**
>
> **(VicRoads 1991, Western Bypass Health Impact Study: Summary)**

Brunswick to Richmond Powerline Review Panel, Victoria

The case of the Brunswick to Richmond Powerline illustrates the difficulty of balancing the broad range of perspectives surrounding a contentious development where there is little conclusive evidence of a potential health impact.

The State Electricity Commission of Victoria proposed to run high voltage powerlines from Brunswick to Richmond in order to maintain security of supply to the CBD and a large sector of Melbourne. The proposal resulted in prolonged opposition from groups who wished to preserve the environmental quality of the Yarra and Merri Waterways. The debate had been characterised by:

> **... unequal recourse to information ..., destructive hostility; inadequate processes for public consultation and debate; solely technical argument to justify a project need; unwillingness by local level organisations to acknowledge ... imperatives such as security of supply; poor communication ..., alarmist media reporting; and no consistent ... scrutiny of a public utility's approach to major project development. (p. 1)**

In the light of this debate, a Review Panel was convened to:

- review proposals and options for the powerline;
- recommend changes with cost estimates;
- recommend policies and public processes which should apply to planning and design of high voltage power lines;
- ensure appropriate time, processes and resourcing of public submissions and discussion with the Panel; and
- provide detailed and relevant advice on the proposal and options.

The terms of reference specifically excluded explicit reference to health effects.

Part of the public debate, however, centred on questions about the risk to health posed by high voltage powerlines. The Review Panel concluded that:

> **The Health Department and the SECV — no matter how self-assured they may feel in their interpretation of the scientific/epidemiological data, cannot realistically expect to allay community concern by defensiveness or resorting only to the cover of professional science. Conversely, groups such as Powerline Action (PAG), which at times exhibits the same degree of certainty and self-assuredness cannot expect to dictate the parameters of public policy. (p. 3-4)**

A variety of standards for judging safe levels of exposure to powerline fields exists and there was not sufficient information to allow the Panel to reach conclusions about 'safe' levels or about the level of risk the community is prepared to accept in return for the provision of a secure and affordable supply of electricity. For continuous exposure to magnetic fields World Health Organization guidelines recommend a safety limit of 1000mG; the Powerline Action Group, on the other hand, claimed levels above 0 5 mG were associated with increased health risk and advocated this as the limit. The Review Panel argued that 'the central issue ... is to develop processes which resource and educate the community at large to the extent where it can, through legitimate political and policy processes, make it clear to government the way it wants to see EMR handled' (p. 192).

The Panel was critical of community education on health effects of powerlines, having witnessed 'gross simplifications', 'misrepresentation of scientific results', 'confusions' and 'evidence of this misinformation being perpetuated even though the health issue itself is a cover to disguise a different motive', 'sections of the professional community [who] may not have appropriate feel for important community dynamics' and 'careless media coverage' (p. **193).**

In an attempt to overcome this deficiency in the process, a committee comprising representatives of all the concerned groups was charged with the responsibility for defining what parameters should be addressed in the health section of the

Environmental Effects Statement. The combined interest groups then assembled the information which had been identified. While they did not reach agreement on all matters they did agree that the 'summary of the research was fair and accurate' (p. 194).

The final recommendations of the Review Panel included the suggestion that improvements in the EIA process be instituted in particular, that the Health Department be involved in further clarification of the concepts of social, economic and health impact assessment, particularly the public health dimensions of social impact, and that it provide assistance with assessment of health impacts of proposed projects. The Panel concluded that in relation to health effects, 'At the very least, a community is entitled to see, and feel confident, that there are in place resources and effective processes by which its elected representatives can receive the very best advice. Some additional resources here will be far outweighed by the economic and social costs of protracted and divisive disputes' (p. 195).

(Victorian Government Powerline Review Panel, 1989, Final Report To The Victorian Government July 1989, Melbourne.)

The LeFevre Peninsula Environmental Health Plan, South Australia

The LeFevre Peninsula Environmental Health Management Plan illustrates ***m*** approach to holistic environmental health risk assessment and management in a defined catchment area.

The Plan was one of a series of pilot plans commissioned by the South Australian Health Commission. Its purpose was to address expressions of concern from the local commumty about the frequency of respiratory health problem, and its aim was to screen out spurious hazards and health problem and focus on potential hazard/health links for the main stages of risk assessment.

It addressed screening and profiling as follows:

2 ***Is there a health problem?***

Complaints by residents, local parliamentarians, medical practitioners and pre-school teachers focused public concern on an excess of poorly specified respiratory problems. Preliminary investigations involving community consultation aimed to confirm and quantify the nature of the problem. Limitations such as a small population, community anger and fear, the desire for confidentiality and a mix of problem types were influential in the investigation.

2 ***Are there any hazards present?***

The restriction to air pollutants allowed a manageable rapid assessment of the sources, types, and emission levels of air pollutants and preliminary modelling of the ground level concentration for comparison with air quality guidelines. An initial assessment of toxicity helped to screen out pollutants of little health concern.

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3 ***Screening for causation***

Having identified the types of respiratory health problems, a preliminary matrix of determinants was constructed to put air pollution into perspective as a cause focusing on well-documented environmental factors.

4 ***Is there potential exposure to a known hazard?***

A preliminary assessment of potential exposure was provided by results of the inventory of air pollutant emissions and the subsequent dispersion modelling, along with available observations of air pollutant concentrations. No evidence of exposure to pollutants above guideline concentrations was found.

(Adapted from Maynard 1990)

Water pollution in Sydney, New South Wales

The following description of the problem of water pollution in Sydney illustrates the results of a failure to address the total environment in determining criteria for development, regulation of pollution and protection of the health of the public. The description is drawn largely from a book by Sharon Beder (1989) entitled Toxic Fish and Sewer Surfing which provides a detailed account of the historical and political processes that have contributed to ocean pollution off the coastline of Sydney.

Background

As Sydney grew, new industries sited themselves near waterways and used them as a free waste disposal system. In September 1962 the Government Analyst described the condition of the Georges River as a menace to public health. Pollution incidents continued to be reported in the media until the 1970s when a Select Committee on Water Pollution in Australia announced that water pollution in NSW had reached crisis point. The NSW Government responded by introducing the *Clean Waters* Act and establishing the State Pollution Control Commission (SPCC) and the Metropolitan Waste Disposal Authority (MWDA). Each waterway was to be classified according to its use and acceptable pollution-carrying capacity. Once a waterway was classified, a polluter would require a licence to discharge specified quantities and types of waste into it. By 1979, however, classification was virtually abandoned because of lack of resources. The Georges River, Cooks River and Alexandra Canal were classified by this time, but the Parramatta River, Botany Bay and Sydney Harbour remained unclassified. While classification was based essentially on whether the waterway was used for drinking water, swimming or fishing etc, it also took into account whether 'realistic' standards could be met by industrial and government polluters. Each classification had to be proposed and publicly advertised before adoption, and was subject to public objections which were heard by a Clean Waters Appeals Board. When the classification process was discontinued the Appeals Board was dismantled and with it the possibility of community input to the management of water quality.

Developments in pollution disposal

Beder identifies a turning point in pollution disposal in NSW. The Clean Waters *Act* forced a few industries to install rudimentary pre-treatment equipment where it was not too expensive, but efforts to clean up the environment in the 1970s directed more waste into the sewers because the emphasis was simply on waste removal, transfer and treatment rather than pollution prevention and control. Not only was liquid industrial waste diverted to the sewers, but air-borne wastes were converted to liquid form and disposed of the same way. The rivers and air were, therefore, cleaned up at the expense of the ocean and beaches. Pollution disposal is currently heavily dependent upon the existence of a well-planned major sewage system discharging via ocean outfalls and accepting increased loads of industrial waste.

Pollution control and health

Licences for the Water Board's ocean outfalls reflect the capacity of existing treatment processes rather than desirable effluent quality to protect the environment and human health. The allowable levels are determined in the context of very limited scientific work on the effects of these substances in Sydney's marine waters and on human consumption of seafood. The NHMRC recommends maximum levels of toxic substances for foodstuffs, including seafood, which are based on average Australian dietary habits and the toxicology of the substances in question. The levels are set for individual toxic substances and do not take into account possible synergistic effects.

Water quality standards for bacteria are based on engineering feasibility as well as epidemiological and scientific data, and both standards and methods of sampling and analysis may differ among regions and statutory authorities responsible for health or pollution control. A study by the NSW Department of Health at the beginning of 1991 (reported in Mobbs and Dickinson 1991) confirmed that there are health risks in swimming at Sydney beaches. The most common symptoms which result are coughs, colds and flu, followed in frequency by diarrhoea, eye and ear infections, fever and vomiting. The study found that people are becoming ill even on days when the beaches are believed to be 'safe'.

The clean-up

The NSW Government has allocated over $400 million to clean up Sydney's beach pollution. The aim is to remove 80% of the solids discharged through outfall using advanced treatment technologies. The Water Board has carried out EISs at its Bondi and Malabar sewage plants to determine the most efficient way to dispose of sludge. The Malabar, Bondi, North Head and Cronulla plants will be updated. Critics of the Government, such as the Stop The Ocean Pollution environmental group, argue that the Government has proposed non-biological treatment alternatives which are tolerant of toxic waste (Mobbs and Dickinson 1991).

Appendix 3

Inter-Governmental Agreement on the Environment

Schedule 3

1 The parties agree:

- that it is desirable to establish certainty about the application, procedures and function of the environmental impact assessment process;
- to improve the consistency of the approach applied by all levels of government;
- to avoid duplication of process where more than one government or level of government is involved and interested in the subject matter of an assessment; and
- to avoid delays in the process.

2 The parties agree that impact assessment in relation to a project, program or policy should include where appropriate assessment of environmental, cultural, economic, social and health factors.

3 The parties agree that all levels of government will ensure that their environmental impact assessment processes are based on the following:

(i) the environmental impact assessment process will be applied to proposals from both the public and private sectors;

(ii) assessing authorities will provide information to give clear guidance on the types of proposals likely to attract environmental impact assessment and on the level of assessment required;

(iii) assessing authorities will provide all participants in the process with guidance on the criteria for environmental acceptability of potential impacts including the concept of ecologically sustainable development, maintenance of human health, relevant local and national standards and guidelines, protocols, codes of practice and regulations;

(iv) assessing authorities will provide proposal specific guidelines or a procedure for their generation focused on key issues and incorporating public concern together with a clear outline of the process;

(v) following the establishment of specific assessment guidelines, any amendments to those guidelines will be based on only significant issues that have arisen following the adoption of those guidelines;

(vi) time schedules for all stages of the assessment process will be set early on a proposal-specific basis in consultations between the assessing authorities and the proponent;

(vii) levels of assessment will be appropriate to the degree of environmental significance and potential public interest;

(viii) proponents will take responsibility for preparing the case required for assessment of a proposal and for elaborating environmental issues which must be taken into account in decisions, and for protection of the environment;

(ix) there will be full public disclosure of all information related to a proposal and its environmental impacts except where there are legitimate reasons for confidentiality including national security interests;

(x) opportunities will be provided for appropriate and adequate public consultation on environmental aspects of proposals before the assessment process is complete;

(xi) mechanism will be developed to seek to resolve conflicts and disputes over issues which arise for consideration during the course of the assessment process; and

(xii) the environmental impact assessment process will provide a basis for setting environmental conditions, establishing environmental monitoring and management program (including arrangements for review) and developing industry guidelines for application in specific cases.

4 A general framework agreement between the Commonwealth and the States on the administration of the environmental impact assessment process will be negotiated to avoid duplication and to ensure that proposals affecting more than one of them are assessed in accordance with agreed arrangements.

5 The Commonwealth and the States may approve or accredit their respective environmental impact assessment processes either generally or for specific purposes. Where such approval or accreditation has been given, the Commonwealth and the States agree that they will give full faith and credit to the results of such processes when exercising their responsibilities.

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Appendix 4

Australian and New Zealand Environment and Conservation Council

A NATIONAL APPROACH TO ENVIRONMENTAL IMPACT ASSESSMENT IN AUSTRALIA

October 1991

The Ministers of the Australian and New Zealand Environment and Conservation Council (ANZECC) are pleased to recommend this report m the Prime Minister and First Ministers for consideration as an essential component of the inaugural Intergovernmental Agreement on the Environment.

The joint communique issued from the Special Premiers' Conference of October 1990, which established the need for the Intergovcmmental Agreement, set as an objective for the Agreement: 'the development of a national approach to environmental impact assessment procedures throughout Australia and greater streamlining of EIA and other approvals processed'.

Working in the spirit of co-operative federalism and realising that such an approach has the potential to achieve substantial gains which would not be possible otherwise, the principles and practice of Environmental Impact Assessment (EIA) in Australia have been reviewed to identify common ground.

While pursuing the benefits of a national focus on EIA it is evident that, notwithstanding variations in practice among governments. there is a high degree of similarity in principles: common threads do exist and a statement of national principles regarding the process of EIA would serve to clarify directions and inform all participants.

The Ministers comprising ANZECC have taken this opportunity to address currently perceived issues surrounding the EIA process and m identify the most effective and efficient approach for this basic tool of environmental management in the 1990s. As EIA is a dynamic process and one that must continually evolve to meet the needs of the Australian community, this review and statement of principles will be re-evaluated within five years.

It should be understood that this statement of a national approach is not a compilation of the status quo. Rather, it is forward-looking in scope and intended to provide incentive to all governments in ensuring that the EIA process provides the environmental perspective that is sought. The National Approach immediately following provides a clear indication of the intent of the review and the substance of the common principles for EIA. It is also important to note that there is a commitment from all jurisdictions to progressively implement these principles, including moving toward a compatible statutory basis, subject to their endorsement through the Intergovernmental Agreement on the Environment.

Australian and New Zealand Environment and Conservation Council
Secretariat GPO Box 787
Canberra City ACT 2601
Australia

Australian and New Zealand Environment and Conservation Council

A NATIONAL APPROACH TO ENVIRONMENTAL IMPACT ASSESSMENT IN AUSTRALIA

1. INTRODUCTION

h accordance with Terms of Reference pmvidcd by the Ministers of ANZECC to the Working Group on a National Approach to Environmental Impact Assessment (EIA) m Australia, the purpose, process and directions of EIA have b u n examined with a wcw to identifying common ground and increasing both effectiveness and cficicncy m application

h most governments m Australia EIA is a proven and valuable process for providing advice to decision-makers for the purpose of environmental protection and management. It has no dccision-making function itself. This difference is important when responding to reviews of 'cnvironmcntal approvals processes' and for proposing solutions m improve EIA. h recent times the three major themes cimcrging from reviews of EIA have been uncertainty, delay and environmental effectiveness of the outcome. Upon closer examination it has not been easy to appomon these themes between the advisory EIA process and decision-makingfunctions.

It was not intended that the scrutiny of the Working Group would apply to the entirety of the development approvals process or to the specific procedural details in each government jurisdiction. Rather, efforts have been concentrated on dcfiining *aspects* of the EIA process that would be amenable to a co-operative approach and, equally important, clcments that would generate a more productive proccss with the benefit of national support and commitment. This means ti the scope for contemplating the likely future directions and capabilities of the process was also part of the review. Thus, it has been m opportunity for taking a forward looking perspective while being mindful of present day needs.

The timing of this review has been set to enable a substantid conmbution to the forthcoming Intergovernmental Agreement on the Environment, due for considcratioa at the Special Premiers' Conferences scheduled for November 1991and early 1992.

Clearly, there are many benefits to be gained fiom such a review. A particularly timely advantage is the oppommity m ruognix the connections between EIA and the concept of ecologically sustainable development. h providing a philosophical foundation for public policy, the goals of ecologically sustainable dcvclopmcnt become a framework for the EIA process. Ecologically sustainable development is presently the subject of intense scrutiny among all governments, with the overriding intention of identifyingthe practicalities of application across public and *private* sectors.

Formulating public policy with due consideration for environmental factors. including views of the community, has major implications for the subsequent evaluation of individual development proposals. If the policy context already exists and is environmentally sound, it follows *that* environmental assessment of a related proposal will be more readily accomplished and with fewer surprises for all concerned. Similarly, EIA is not a substitute for the planning process — the assessment of proposals is enhanced if there is a planning context which has taken environmental factors mm account

Consistent with current international approaches to reviewing environmental protection mechanism within federal systems and modifying them to be more responsive to evolving community needs, ANZECC has concentrated on the important principles rather than attempting uniformity in process. Accordingly, the purposes of this national approach are:

- to reach a common understanding and agreement on principles and, what appropriate, the practice of EIA in Australia
- to improve the EIA process. including increasing the efficiency of the contribution made by the process to environmental daision-making
- to the fullest extent possible, reducing uncertainty about the application, procedures and function of tic process
- to promote public understanding and to provide and facilitate consistent opportunities for public involvement
- m improve consistency of approach between jurisdictions in Australia responsible for EIA
- to ensure that where proposals may have cnvironmcntal impacts across more than one jurisdiction, consistent environmental protection measures can be applied
- to avoid duplication where multiple jurisdictions are involved
- to identify and apportion responsibilities for participants m the EIA process.

2. TERMINOLOGY

In developing this national approach to EM m Australia ANZECC has elected to interpret the meaning of environment in a broad way, noting that many diverse factors arc linked through ecological and social systems. Environmental factors will, however, vary in significance between proposals.

Environment

For tic purposes of EIA, the meaning of environment incorporates physical, biological, cultural, amomic and social factors.

Environmental Impact Assessment

This is a process for the orderly and systematic evaluation of a proposal including its alternatives and objectives and its effect on the environment including the mitigation and management of those effects. The process extends from the initial concept of tie proposal through implementation to completion and, where appropriate, decommissioning.

Environmental Impact Statement (EIS or similar name)

This is a document prepared by the proponent to present the case for the assessment of their proposal as part of the environmental impact assessment process.

Assessment Report

This is a document prepared by the assessing authority to review the contents of an EIS (or similar name) to provide environmental advice on the proposal to decision-makers.

Environmental Significance

The EIA process is normally initiated if a proposal appears likely to have a significant effect on the environment The concept of environmental significance is applied at a number of points m the process including referral of proposals, level of assessment applied and evaluation of potential impacts.

h the EIA context, the concept of environmental significance is a judgement on the degree of importance and consequence of anticipated change imposed on the environment by a proposal.

This judgement is based upon the following factors:

- character of the receiving environment and the use and value which society has assigned to it
- magnitude, spatial extent and duration of anticipated change
- resilience of the environment to cope with change
- confidence of the prediction of change
- existence of politics, programmes, plans and procedures against which the need for applying the EL4 pmcess to a pmposal can be determined
- existence of environmental standards against which a propod can be assessed
- degree of controversy on environmental issues likely to be associated with a proposal.

Monitoring and Audit

Monitoring is a term used in EIA to describe both the checking of the predicted impacts of a proposal m order to improve environmental management practices; and to check the efficiency and effectiveness of the EL4 process. and the reporting of the results.

Audit is a term used in EM principally to describe the check for compliance with conditions of environmental approval. but also as an internal review of environmental management practices by proponents. Additionally, it is a form of site evaluation for environmental liability before purchase or development by proponents. The reporting of results applies to all of these uses of audit.

Public

The public includes any individual or group.

3. OBJECTIVES OF EIA IN AUSTRALIA

Environmental impact assessment m Ausualia is now a mature process within the overall machinery of government decision-making. This national approach is aimed at consolidating the benefits of EIA and providing a springboard for the next major sup m the evolution of the assessment process. This will doubtless be needed to assist implementation of ecologically susrainable development m a practical way.

h addition. EIA is fundamentally a process to achieve protection and management of the environment and the maintenance and enhancement of environmental quality.

Therefore. within these contexts the objectives of EIA for the national approach are:

- to ensure that decisions are taken following timely and sound environmental advice
- m encourage and provide oppommities for public participation io environmental aspects of pmposais before decisions are taken
- m ensure that proponents of proposals take primary responsibility for protection of the environment relating m their proposals
- to facilitate environmentally sound proposals by minimising adverse impacts and maximising benefits to the environment

- to provide a basis for ongoing environmental management including through the results of momtoring

- to promote awareness and education m environmental values.

The most important way that EIA can be improved is to monitor performance of the process m a systematic manner. Through monitoring it is possible to how whether the objectives of EIA are being met. Furthermore, the results of such monitoring provide the basis for additional improvements to the EIA proccss

4. CONNECTIONS BETWEEN EIA AND ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Ecologically sustainable dcvclopmcnt has been recognised by governments m Australia as a statement of objectives. aimed at mflucncing all decision-making. EIA is seen as one way amongst many for achieving the objectives of ecologically sustainable development.

Some of the major connecting points where EIA can assist in achieving ecologically sustainable development arc:

- the use of resources by present generations is achieved while protecting the interests of future generations through. for example:
  - maintaining and cnhancmg natural capital (for example clean water. clean air, uncontaminated soil)
  - avoiding over-exploitation of renewable resources
  - minimising waste
- protection of biodiversity and ecosystem integrity
- provision of net community benefits from proposals that are implemented
- social equity, for example through public participation m the decision-making process
- reflection of full environmental costs of proposals m decisions on resource use
- caution m dealing with environmental risk and irreversibility.

5. NATIONAL PRINCIPLES OF EIA IN AUSTRALIA

The key outcome of a national approach should be a better process. leading to better protection and managcmcnt of the environment All participants have both opportunities and responsibilities for achieving a better process through the adoption of these national principles. This is consistent with tic general theme that prtxeaion and managcmcnt of the environment, for which EIA is a mol. is the responsibility of everyone.

The EIA proccss is designed to be open and accountable to the public. Accordingly, specific points for public involvement and accountability have been included in the roles of the participants m the process. In addition. information arising from the EIA process should (unless commercially confidential or related m matters of defence or national security) be accessible to the public to improve both the process and the protection and management of the environment.

Accordingly, major educational benefits for all participants m the EIA process, regarding important environmental values, should be realised.

5.1 PRINCIPLES FOR ASSESSING AUTHORITIES

PRINCIPLES FOR ASSESSING AUTHORITIES

(a) Rovidc clear guidancc on types of proposals likely to attract environmental impact assessment and on levels of assessment.

(b) Provide proposal-specific guidelines (or a procedure for thcir generation) focussed on key issucs and incorporating public concerns; and a clear outline of the ELA process. Amendments to guidelines should only be based on significant issucs that arise after guiddines have been adopted

(c) Rovidc guidance to all participants m the ELA process on criteria for environmental acceptability of potential impacts i ·cluding such things as the principles of ecologically sustainable dcvclopment, maintenance of environmental health. relevant local and national standards and guidelines, codes of practice and regulations.

(d) Negotiate with key participants to set an assessment timetable on a proposal-specific basis and commit m using best endeavours m meet it

(e) Seek and promote public participation throughout the proccss. with techniques and mechanisms tailored appropriately m specific proposals and specific publics.

(f) Ensure that the mtal and cumulative effects of using or altering commtity environmental assets (for cxamplc air, water, amenity) receive explicit consideration.

(g) Report publicly on the assessment of proposals.

(h) Ensure predicted environmental impacts are monitored, the results assessed by a nominated responsible authority and fudback provided to improve continuing environmental management of proposals.

(i) Monitor properly the efficiency and effectiveness of the environmental impact assessment process to learn from the past, streamline requirements and help maintain consistency.

(j) Rcvicw. adapt and impkmcnt techniques and mechanisms which can improve the process and minimise uncertainty and delays.

(k) Ensure t i educational oppommities inherent m the ELA process are actively pursued.

COMMENT

Environmental advice from assessing authorities should be given on:

- *draft(s) of the documentation king prepared for the proposal by the proponent*
- *findings on the environmental benefits a d disbenefits of the proposal. which may include a recommendation on whether t k proposal could proceed; these findings should be b a d upon:*
  - *whether and why environmental impacts are manageable within tolerable limits*

- *whether and why t k degree of uncertainty of impacts (ie t k risk to the environment) is sufficiently low to be confident about not encountering unforeseen problems*
- *whether there are ways to eliminate avoidable impacts, minimise adverse impacts and maximise benefits to the environment*
- *whether t k impacts are likely to be cumulative*
- *what the implications are of using community assets*
- *whether and why t k programme for minimising, ameliorating, managing and monitoring d l impacts is sound and is likely to protect the environment*

- *environmental issues raised by the public. local government and State and Commonwealth agencies*
- *the proponent's response to issues raised during public consultation*
- *whether or not the proponent is likely to be able to fulfil environmental commitments and responsibilities*
- *conditions for environmental protection which should be applied*

Assessing authorities should seek expert advice on any relevant aspects of significant environmental issues.

5.2 PRINCIPLES FOR PROPONENTS

PRINCIPLES FOR PROPONENTS

(a) Take responsibility for preparing tic case required for assessment of a proposal.

(b) Consult tic assessing authority and the community as early as possible.

(c) Incorporate environmental factors fully into proposal planning, including a proper examination of reasonable alternatives.

(d) Agree on a proposal-specific evaluation timetable and commit to using best endeavours to meet it

(e) Take the oppommity offered by the EIA process to improve the proposal environmentally.

(f) Make commitments to avoid whcrc possible and otherwise minimise, ameliorate, monitor and manage environmental impacts; and implement these commitments.

(g) Amend environmental management practices responsibly, following provision and dissemination of environmental monitoring results

(h) Identify and implement responsible corporate environmental policies, strategies and management practices, with paiodic review.

COMMENT

Proponents have the responsibility to prepare and present the case for the assessment of tkir proposal. The case should include:

- *a description of the proposal and its objectives; m broad benefits and disbenefits arid w k r e they are borne within the community; and justification for the proposal*
- *a description of the existing environment*
- *alternatives and associated potential environmental impacts including the no-change option*
- *predictions of environmental impacts and their consequences (including those identified in guidelines, direct and indirect, short and long term. cumulative, and with an estimation of the amount of uncertainty involved)*
- *a p r o g r a m for minimising, ameliorating, managing and monitoring impacts; and a commitment to implement the programme*
- *responses to issues raised during public and agency review.*

The case prepared by the proponent should respond to the issues raised in guidelines, be preserved in a form and style that is readily understandable, and present conclusions fairly - bared upon sound principles.

5.3 PRINCIPLES FOR THE PUBLIC

PRINCIPLES FOR THE PUBLIC

(a) Participate m the evaluation of proposals through offering advice, expressing opinions, providing local knowledge. proposing alternatives and commenting on how a proposal might be changed to better protect the environment.

(b) Become mvolved m the early stage of the process as t i is the most effective and efficient time to raise concerns. Participate m associated and earlier policy. planning and programme activities as appropriate. smcc these influence the development and evaluation of proposals.

(c) Become informed and mvolved m the administration and outcomes of the environmental impact assessment process, including:

- assessment reports of the assessing authority
- policies determined, approvals given and conditions set
- monitoring and compliance audit activities
- environmental advice and reasons for acceptancc or rejection by daision-makers

(d) Take a responsible approach to opportunitics for public participation m the EIA process. including the seeking out of objaxivc information about issues of concern.

COMMENT

The public should have timely access to information about proposals (subject to commercial confidentiality or matters related to defence or national security) in aform suitable to enable informed involvement m the EIA process, including the scope of the assessment.

Public participation in the EIA process should d m to achkw the following objectives:

- *to ensure that the public is informed in an adequate and timely manner*
- *LO ensure that environmental issues of public concern are r a i d and addressed*

- *to ensure that the process is open*
- *to take opportunities to resolve problems w k r epossible*
- *to ensure that the communiry has input to the apportionment of environmental benefits and disbenefits*
- *to assist in better environmental advice going to decision-makers*
- *to enable the public to both advise on and learn more about environmental values.*

5.4 PRINCIPLES FOR GOVERNMENT

PRINCIPLES FOR GOVERNMENT

(a) Provide policy and planning frameworks which set contexts for the environmental assessment of proposals.

(b) Base decisions on proposals having potentially significant environmental impact on advice resulting from the EIA pmcess and include provisions for effective protection and management of the environment.

(c) Apply the EIA process equally to proposals from both the public and private sectors.

(d) Within each jurisdiction (Commonwealth. State/Territory) provide for a coordinated government decision-makingprocess to which the outcomes of EM can be directed; and develop mechanisms to synchronise processes for decision-making such that, where possible. the opportunity exists for decisions to be made m parallel rather than sequentially for proposals requiring multiple approvals.

(e) Ensure assessment reports are available to the public before or at the time of decision-making.

(f) Establish one national agreement to ensure a single orderly proccss is in place where the EIA responsibilities of several governments arc involvd.

(g) Provide support, if and when appropriate. to participants in the process to enable better and informed involvement.

(h) Provide opponumtics for rcasoaabk public and proponent objections, on decisions made other than at Ministerial level, regarding the requirement for and level of assessment, adherence to due process. and environmental advice given to decision-makers.

(i) Implement this national approach including, where appropriate, progressive amendment of statutory provisions. to increase consistency m the process.

(j) Maintain the integrity of the EIA proass.

COMMENT

The principles of EIA are also applicable to propods not normally subjected to an assessment process administered by a central agency. Consequently, there arc opponunities for state and local government agencies to assume a greater role in environmental protection by adoption of these principles.

The quality and efficiency of the EIA process can be enhanced when the framework is supported by useful data bases on the environment. This in nun leads to better environmental protection. Broad government cooperation is required to facilitate comprehensive data gathering, storage and retrieval system.

6. NATIONAL PRACTICE FOR EIA IN AUSTRALIA

6.1 APPLICATION OF THE PRINCIPLES OF EIA TO PROJECTS, PROGRAMMES, PLANS AND POLICIES

Environmental impact assessment of proposals has had most application to, and success with, the evaluation of projects.

The evaluation of projects is generally simplified, expedited and the outcome more certain if associated policies, plans and programmes have taken environmental factors into account h mm. the outcome of project evaluation should influence relevant policies, plans and programmes.

There is little doubt that EIA works best m a policy context which is already environmentally sound. Many of the principlcs and objectives specifically recommended m ti national approach for the assessment of project proposals would be as cffectiveiy, and often more efficiently. applied to policies and major programmes. Ensuring that environmental considerations are taken nm account at this level of decision-makingcould tie a variety of forms. These include, for example:

- development of industry guidelines which incorporate good environmental practice
- the inclusion of environmental protection *criteria* m legidation
- the integration of principles of ecologically sustainable development concepts into government development policies
- the specific inclusion of environmental assessment m legislation
- the integration of cnvironmcntal considerations into government programmes.

The application of the principles of EL4 to policies, plans and programmes is becoming increasingly important to set a framework for project evaluation; to expedite the process and make outcomes more predictable; and m increase the degree of planning certainty for proponents and the communiry — regardless of whether or not the EL4 process itself is applied. It should be appreciated that other mechanisms such as planning processes, resource assessment and a variety of community involvement processes could provide effective m a n s of implementing the objectives of EIA.

6.2 REQUIREMENTS FOR INITIATION OF THE EIA PROCESS

Clear criteria should be developed for proposals likely to lead m initiation of the EIA process by assessing authorities.

There should be opportunities for proponents, the public and decision-making authorities to refer proposals for consideration regarding the initiaaon and application of EIA.

Initiation of the cnvironmcntal impact assessment process should be as early as practicable m the planning of the proposal.

The Minister ar agency responsible for administeringthe EIA process shouki have the power to initiate the process.

6.3 LEVELS OF ASSESSMENT

There should be different levels of assessment in the EIA process (more than one of which should involve public participation) to take account of the type and scale of the proposal under consideration. the significance of the environmental context in which it is proposed to occur and the associated degree of public inuxcst.

6.4 TIME SCHEDULE

A timc schcdulc for all stages of the cnvironmcntal impact assessment process should be set out early, in consultations between the assessing authority, the proponent and other involved bodies on a proposal-specific basis.

Any proposed change to the timc schedule by any party should be indicated early and a new schedule set by the same proccss.

All parties should commit to using their best endeavours to meet the time schedule.

6.5 OUTCOMES

- All outcomes of the EIA process should be public.
- The Minister or assessing authority responsible for the EIA process should have the power to recommend environmental conditions.
- Ministers or authorities responsible for decision-making should take environmental advice into account.
- Enforceable auditable conditions to protect the environment should be set by decision-makers and made public.
- Ministers or authorities responsible for decision-making following EIA should give reasons for decisions publicly.
- Where there is a disagreement on environmental acceptability and/or conditions, then resolution should occur between Ministers or the Cabinet, as appropriate.
- Decision-making by Government following the EIA process should be the time of trade-off for any unavoidable differences (benefits and disbenefits) which may emerge from the process.
- Environmental conditions set on approved proposals should ensure that environmental management can change as a consequence of monitoring information to result in continued effective environmental protection.
- Should a proposal not proceed within a reasonable timeframe then there may be a requirement for re-assessment of the proposal.

6.6 PROPOSAL FACILITATION

Proposals should be facilitated through the EIA process by assessing authorities in an interactive way to assist appropriate proposal modification to better protect the environment

In addition, the facilitation of proposals through various Government decision-making processes generally assists in reducing delays and uncertainties. However, it is difficult to avoid potential conflicts of interest if the assessing authority plays a role in facilitating proposals other than as related to the EIA process. The conflict comes from being seen both to act for the proposal and to offer judgement upon it.

Accordingly the benefits of project facilitation should be realised by an agency of Government other than the assessing authority — for proposals attracting the EIA process.

6.7 ARRANGEMENTS BETWEEN JURISDICTIONS

A National Agreement Between States/Territories/Commonwealth

A single agreement between Ministers or agencies responsible for EIA m all States and Territories and the Commonwealth on the administration of the process should be negotiated, with Schedules to accommodate individual legislative arrangements. This National Agreement would supersede existing arrangements.

The national agreement should include:

- prompt early consultation regarding proposals likely to fall titi the responsibilities of the respective jurisdictions — or likely to affect, deleteriously, adjoining jurisdictions
- one process to avoid duplication and to satisfy all requirements including scope, documentation, timetable and public involvement
- coordinated environmental advice to involved Governments
- coordinated (in time) decision-making including consultation on the environmental acceptability of proposals
- processes for the evaluation of proposals beyond the three nautical mile limit of State/Territory jurisdiction but which have the potential to have environmental impacts on the cnvimnmcnt within State/Territory jurisdiction.
- arrangements for meeting International Treaties and Protocols with cnvironmcntal components to which Australia is a signatory.

State/State - State/Territory

Schedules to the National Agreement should accommodate arrangements between States/Territories, as appropriate.

Multiple Jurisdictions

Proposals involving more than two jurisdictions should be considered on a case by case basis under the National Agreement, unless tie States involved and tie Commonwealth agree that the proposal should be assessed under Commonwealth EIA legislation. To date, these instances have been rare (for example the Very Fast Train proposal or some titi the Murray-Darling Basin).

7. REVIEW OF THE NATIONAL APPROACH TO EIA IN AUSTRALIA

This national approach to environmental impact assessment m Australia should be reviewed by the Australian and New Zealand Environment and Conservation Council within five years from adoption

ADOPTED BY
THE AUSTRALIAN AND NEW ZEALAND ENVIRONMENT AND CONSERVATION COUNCIL
OCTOBER 1991

DISCUSSED

ATTACHMENT

The National Approach was prepared for the Australian and New Zealand Environment and Conservation Council by a Working Gmup with the following terms of reference:

1. To nview the purpose of environmental impact assessment in Australia having regard to the preliminary work carried out under ANZECC Project 90/14 'The Functions and Purposes of Environmental Assessments' and the conclusions of EIA officials reached m Adelaide m 1990.

2. To review the processes of environmental impact assessment with particular intent to:

   (a) identify m y areas of inconsistency or of ovcrlappmg or dual responsibility between agencies. and how any problems deriving fmm those matters could be minimised; and

   (b) idcntify those dements of environmental impact assessment m Australia for which a national approach would be beneficid and achievable.

   The work carried out under ANZECC Project 90/14 "The Functions and Purposes of Environmental Assessments" may form an appropriate bask to commence the review.

3. To formulate a proposal for ANZECC consideration. through Standing Committee, for a national approach to principles and. where appropriate, the practice of environmental impact assessment and greater streamlining of E M and other approvals processes. The proposal to be presented m a format and style such that it can be used as a key mput to the forthcoming Special Premiers' Conference scheduled for November 1991 when it considers the proposed hcrgovcmmcntal Agreement on the Environment. The proposal should take account of the State Premier's Conference support for the rationalisation of regulatory activities undcnakcn at different levels of government, particularly in relation to the development of improved national standards. Areas where common or revised mechanisms may bc appropriate to achieve desirable objectives should be identified.

4. To consult, as appropriate. representatives of proponent groups. community groups and relevant government agencies during the formulation of the Working Group's proposal.

5. Subject to ANZECC's agreement, to employ a consultant to assist m the preparation of the proposed. *(Note: ANZECC approved the employmenr of an Executive Officer)*

6. To ensure that the proposal is submitted to Standing Committee prior to 30 August 1991 so tii it cm be considered m final form by ANZECC by 30 September 1991.

7. ANZECC at its meeting on 22 March 1991 added the following task:

   To prepare an indicative list of industries for which national guidelines should bc developed before site specific proposals are received *(Note: This has been addressed in a background papa, prepared by the Working Group for ANZECC on the national approach)*

The working *Group* comprised:

WA

Mr Rokn Sippe (Chairman)
Director, Evaluation Division
Environmental Protection Authority
PERTH WA 6000

Mr John Arhc
Assistant Secretary, Environment &
Assessments Branch
Department of Arts, Sport, the Environment,
Tourism and Territories
CANBERRA ACT 2601

Ms Christine Lawrence
Director, Procedures & Agreements Section
Department of Arts, Sport, the Environment,
Tourism and Territories
CANBERRA ACT 2601

VIC

Mr Robin Saunders
Chief Assessment Officer
Department of Planning and Housing
MELBOURNE VIC 3000

ACT

Mr George Tomlins
A/Assistant Secretary, Executive Branch
Department of Environment, Lands and
Planning
CANBERRA ACT 2601

alternate

Mr Norrie Sanders
Senior Environmental Planner
ACT Planning Authority
TUGGERANONG ACT 2901

EXECUTIVE OFFICER

Ms Mary Lou Morris
Assistant to the Director-General
Department of Environment and Planning
ADELAIDE SA 5000

NT

Ms Barbara Singer
Executive Officer, Environment Protection
Unit
Conservation Commission Northern
Territory
PALMERSTON 0831 NT

NSW

Ms Barbara Adams
Acting Head, Heritage Assessments
Resources Division
Department of Planning
SYDNEY NSW 2601

QLD

Mrs Noela Eddington
A/Assistant Director, Division of
Environment
Department of Environment & Heritage
NORTH QUAY QLD 4002

Lis

Mr Alan Sann
A/Director, Division of Environmental
Management
Department of Environment and Planning
HOBART TAS 7001

SA

Mr Rod Hook
Manager, Major Projects & Assessments
Department of Environment & Planning
ADELAIDE SA 5000

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Appendix 5

Guidelines for identification of environmental significance

Commonwealth Environmental Protection Agency

A Physical environmental criteria

A.1 Natural physical factors

a. Land disturbance

- is widespread or involves extensive earthworks for construction of buildings, other structures, cable reticulation, access tracks or the use of off-road vehicles; or
- for defence proposals, involving new weapon or demolition ranges, new training areas or proposals for existing ranges or training areas m which the current impact would be significantly increased.

b. Erosion may cause serious erosion or subsidence.

c. Hydrology may adversely affect the quality or volume of surface or groundwater, and

- is likely to cause salting;
- involves disturbance to drainage patterns (including construction of dams, the relocation of watercourses, or increased flood potential);
- involves blasting or dredging in rivers, lakes or estuaries; and
- involves drainage or alteration of wetlands or mangroves.

d. Oceanography

- involves significant change in wave action, sediment movement or accretion, or water circulation patterns;
- results in dune erosion, littoral drift or changes in beach and dune systems;
- may cause scouring of sea bottom; and
- may affect reef, cay, shore beach or island profiles.

A.2 *Biological factors*

a. Conservation

- may reduce genetic diversity;
- is situated in or near a declared or proposed National Park, Nature Reserve, State Forest, conservation area, recreation area or important landscape feature; or

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- creates a significant demand for a resource which is likely to become in short supply.

b. Ecology, habitats, flora and fauna

- may impair essential ecological processes or life-support system;
- are in or close to a known habitat of any rare or endangered species or association of flora and fauna;
- involve an area which is listed in and protected by an international species convention or agreement;
- involve construction or activity in a known environmentally sensitive area (eg watercourse, wetland, active dune, beach, estuary, alpine area, arid lands or rainforest);
- involve an area which has not undergone major alterations from pre-European condition;
- involve large-scale clearing, burning or modification of vegetations;
- may, either directly or indirectly, cause major displacement of fauna or create significant barriers to fauna movement (for feeding, breeding or migration);
- may cause loss or unavailability of important breeding sites or habitats;
- have the potential to significantly disrupt an ecosystem;
- may cause the introduction of noxious weeds, vermin or disease, or exacerbate the spread of known pathogens or pest/problem species;
- involve extensive use of pesticides, herbicides or fertilisers or other chemicals which may build up residues in the environment;
- may substantially increase the fire risk; or
- involve the release of an exotic organism or species to the environment, including organisms connected with biological control or genetically engineered organisms or the possible accidental release of an exotic organisms or species.

c. Marine

- may limit use of marine areas for research, conservation or scientific purposes, or recreation;
- is located in or near or may cause damage to sensitive marine or coastal environments (eg mangroves, sea grass beds or coral reefs);
- may disturb marine ecosystems through dredging or blasting of ocean floor or reefs;
- may cause adverse effects on marine life (eg due to noise, vibration, lighting changes, toxicity or sedimentation); or

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- m y cause serious impediment to reproductive success or migration of marine species, or adversely affect feeding grounds.

A.3 Pollution factors

a. Air

- m y cause large scale generation of dust, smoke, grit, odorous fumes or other toxic or radioactive gaseous emissions; or
- may increase atmospheric concentrations of gases which contribute to the greenhouse effect (eg carbon dioxide, methane, chlorofluorocarbons, ozone, nitrous oxide).

b. Water

- may cause deterioration of local water quality by large changes in levels of eg salinity, colour, odour, turbidity, temperature, dissolved oxygen (BOD), nutrients, pH factor (acidity/alkalinity), or other pollutants such as oil, toxins or heavy metals;
- introduces deleterious anti-fouling compounds (eg TBT); or
- may cause increased risks to marine navigation or result in damage to marine environment through accidental spills of oil, fuel, cargo, waste or sewage.

c. Wastes

- involves disposal of large volumes of sewage, industrial or domestic wastes;
- involves disposal of large or deleterious volumes of spoil, overburden, or mine process wastes.

d. Hazardous products

- may create hazards due to the use, storage, disposal or transportation of flammable, explosive, toxic, radioactive, carcinogenic or mutagenic substances, or substances suspected of being carcinogenic or mutagenic;
- involves the emission of dangerous levels of electromagnetic radiation;
- involves the generation of electromagnetic or other radiation which may adversely affect nearby electronic equipment or human health.

B Social environmental criteria

B.1 Socioeconomic factors

a. Land use

- involves significant land use or zoning changes (including the disposal of land) to which community based objections have been raised or can be expected;
- involves substantial acquisition of land;

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- may substantially affect, or be incompatible with, existing use and amenity, or existing use and amenity of surrounding areas;
- may change the economic value of land or water;
- involves the construction or use of a substantial number of residential dwelling units within the one locality to serve project staff;
- in known geographically sensitive areas, involves major alterations of existing Commonwealth facilities, the provision of service housing, or the provision of other new facilities;
- may curtail alternative beneficial uses of an area (eg conservation or recreational usage); or
- may limit use b other users, or place increased demands on natural resources in local short supply (eg water, timber or natural bushland).

b. Resource use

- involves foregoing the development of alternative uses of a natural resource;
- may seriously affect the livelihood of existing users; or
- may cause disruption to industries involving use of renewable resources (eg fishing) or loss of species (eg damage to spawning and nursery areas).

c. Population changes

- involves large population movements including influx or departure of construction or operational workforces to or from existing towns, or the creation of new towns;
- may cause substantial changes to the demographic or ethnic structure of a community;
- may cause the economic stability of a community or its public sector revenue or expenditure base to change markedly; or
- may have affects on traditional activities.

B.2 ***Community aspects***

a. Demands on community services

- involves substantially increased demands on services (eg housing, welfare, education, health) and facilities (eg power, water, transport, communications, waste disposal, recreation).

b. Transport

- may cause substantial increases in traffic hazards or congestion, including effects on vehicular access and parking, or vessel access/ egress and mooring in marinas;
- may cause substantial increase in day or night traffic noise or vibration, particularly from rail or heavy vehicle movements;

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- may cause a substantial increase in vehicle emissions or vessel effluents;
- may limit marine navigation or navigability of inland waterways;
- involves substantial increases in aircraft movements (especially landing and taking off) over residential areas;
- may limit future use of air space or ground space or shipping lanes by other users; or
- involves low-flying aircraft or overland supersonic flights whish would significantly increase current impacts.

B.3 Heritage aspects

a. World heritage

- impinges on or is adjacent to an area listed or nominated as a World Heritage Area or under investigation for nomination as a World Heritage Area.

b. National estate

- impinges on or is adjacent to a site, building or structure listed in or nominated for inclusion in the Register of the National Estate.

  Note: In the case of items listed in the Register or subject to interim listing, the Heritage Commission should also be provided with details of the proposal in accordance with Section **30** of the *Australian Heritage Commission Act*.

c. Aboriginal

- may cause adverse effects on Aboriginal communities by restricting access to land, disturbing sacred sites or causing changes in life-style or affecting other cultural values;
- is located on or near an area owned or subject to a Land Claim by Aboriginals; or
- may cause damage to Aboriginal anthropological or archaeological sites or relics or result in increased visitation to areas likely to contain archaeological sites, relics or artefacts.

d. Non-Aboriginal heritage

- is located on or near any other important architectural, cultural, historic, scientific, scenic or educational site;
- may adversely affect traditional activities; or
- may cause damage to historic shipwrecks.

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B.4 Environmental reservations

- where concern or reservations have been expressed regarding environmental aspects of the proposed action by Commonwealth, State-NT or local government, a community or the public; or
- is likely to be of an environmentally controversial nature.

B.5 Other legislation

- may conflict with existing relevant Commonwealth, State or Territory environmental legislation.

C Noise, visual and other criteria

C.1 Noise factors

- may cause substantial increase in noise and vibration from stationary plant and other on-site activities and equipment affecting people working or residing nearby;
- may cause substantial increase in road or rail traffic noise and vibration (see also section B. 2 (b));
- involves substantial increases in aircraft or vessel noise (see also section B. 2 (b)); or
- involves use of explosives near residences or sensitive buildings, or in sensitive marine environments.

C.2 Visual factors

- involves buildings, towers, masts or other structures, works or activities (or associated site acquisitions) which may cause unacceptable visual impact by:
  - obstruction of views;
  - exceeding local planning authority or other height and/or gross floor area restrictions;
  - degradation of scenic amenity by imposition of man-made structures into a natural landscape (particularly skyline effects visible from publicly accessible areas);
  - degradation of scenic amenity by extensive land disturbance or vegetation clearance; or
  - major shadow or reflection impacts on adjacent properties.

C.3 Other factors

- loss of aesthetic or communal amenity; and
- creation of adverse wind effects.

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D Health and safety criteria

- **increases risk to health through raised environmental levels of hazards (eg chemical residues);**
- **increases risk of long term health damage through incremental pollution;**
- **pollutes the food chain; or**
- **creates a serious risk to the safety or health of workers or neighbouring populations.**

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Glossary

Cost-benefit analysis (CBA)

CBA seeks to determine whether the benefits of an activity are worth its monetary costs. CBA focuses on those impacts that are more easily measured.

Cost-effectiveness analysis (CEA)

CEA reviews the different ways of achieving the same objective, with the consequences often expressed in physical units such as Quality of Life (QOL) Years.

Cost-utility analysis (CUA)

CUA values health outcomes relative to one another rather than in economic terms.

Development

Broadly, development may be defined as desirable change based on social goals. As used in this report, it refers not only to industrial projects, infrastructure and services, but to any human pursuit that significantly alters the natural or modified environment.

Ecologically sustainable development (ESD)

ESD aims to meet society's needs in ways that maintain the productivity and variety of resources and ecosystems without compromising the ability of future generations to meet their own needs (World Conservation Union 1990, OECD 1990, ESD Working Parties 1991).

Environment

'All aspects of the surroundings of man, whether affecting him as an individual or in his social groupings' *(Commonwealth Enuironment Protection (Impact Proposals) Act 1974; NSW Environment Planning and Assessment Act 1979)*

Environmental and health impact assessment (E&HIA)

E&HIA is an internationally accepted term used by the World Health Organization, and is preferred, to designate that health impact assessment (HIA) and environmental impact assessment **(EIA)** constitute essentially one process (WHO and CEM 1992)

Environmental auditing

Environmental auditing measures how efficiently and effectively a project is meeting its environmental and health objectives with regard to both the physical and human environment. It assesses not only the impact of a particular project, but also the cumulative effects of associated developments in the region.

Environmental monitoring

Environmental monitoring is concerned with identifying and measuring impacts from developments using repetitive observation of one or more elements or indicators of the environment according to pre-arranged schedules (Bisset and Tomlinson 1988). These observations are used to test hypotheses about the potential impact of a development upon the environment.

Exposure

Exposure defines the quantity of an environmental agent that has reached the individual (external dose) or that the individual has absorbed (internal/absorbed dose). The term can also be applied to the community. **Cumulative exposure** is exposure to additive doses over time. **Synergistic exposure** is exposure to the interactive impact of different agents which of themselves may not necessarily constitute a hazard, but which may become toxic in conjunction with other agents.

Health

A broad definition of health has been adopted for this report, encompassing social and psychological as well as physical well-being. The term refers to human health, and includes public, occupational and environmental health and well-being. Health impact assessment is grounded in the principles of modem public health, as set out by the World Health Organization (1989b):

> **Good health and well-being require a clean and harmonious environment in which physical, psychological, social and aesthetic factors are all given their due importance.**

Health authorities

Those government authorities with jurisdiction in the health area at Commonwealth, State/Territory and local levels.

Health impact assessment (HIA)

The process of assessing the effect of a development or a proposal on human health. Throughout this report, the term describes a process which must be an integral part of environmental impact assessment; it does not imply a separate administrative process.

Public health

Public health is a combination of science, practical skills and beliefs that is directed to the maintenance and improvement of the health of all people. It is one of the efforts organised by society to protect, promote and restore people's health through collective or social actions (PHA Policy Statements, October 1992).

Profiling

The process of establishing the baseline condition of relevant parameters of the affected community so that likely impacts can be predicted and subsequently monitored. The term is derived from social impact assessment.

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Risk assessment

The identification of environmental health hazards, their adverse effects, target populations, and conditions of exposure.

Risk communication

The process of sharing information and perceptions about risk. This report sees risk communication not simply as a process whereby experts inform lay people about the scientific and technical aspects of a development or activity, but as a two-way interaction in which experts and non-experts exchange and negotiate perceptions relating to both scientific facts and community values and preferences.

Risk estimation

The process of combining the nature of the hazard, dose-response relationships and exposure estimates to quantify the risk to a specific population. The end product is a qualitative and quantitative statement about the type of health effects expected and the proportion and number of affected people in a target population, including estimates of the uncertainties involved. The size of the exposed population needs to be known.

Risk management

The practical application and implementation of risk assessment to meet specific goals and achieve safe implementation of the proposals. Risk management is the process by which a regulatory agency and community decide what to do about the results of a risk assessment, where decision-makers and interest groups develop policy guidelines or management procedures, based on the results of risk assessment combined with feasibility and economic and socio-political realities.

Risk perception

The subjective perception of the gravity or importance of the risk based on the subject's understanding of relative risks and the social and personal judgement of their importance.

Screening

The process of identifying, as early as possible, those projects with potentially significant impacts that should be subject to E&HIA.

Scoping

The purpose of scoping is to determine the focus and scope which will be necessary in an E&HIA, to enable an informed decision to be made on the proposal in question. It identifies the issues to be considered in depth and those to be eliminated, and it allocates responsibilities for preparing the assessment (Ross 1991).

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Stakeholders

Those individuals or groups who have a legitimate interest, that is, they are directly affected by a project or development. Stakeholders may include tie proponents of projects, decision makers at all levels of government, the practitioners of E&HIA, those responsible for health and welfare planning and provision of services, and the workers and community members who will be affected by tie development.

Standard

A guideline or limit which dictates an acceptable performance level and which is legally enforceable through accompanying regulatory mechanism. Standards may be based on an objective assessment of risk, or more commonly, on a threshold exposure below which there are no observable adverse effects; alternatively, a risk co-efficient may be defined in terms of adverse effects per million persons per unit of exposure, a judgement made on the risk that is acceptable to society m return for the benefits, with exposure limits and regulatory control set accordingly.

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