From Mitigation to Sustainability: Going Beyond Reactive Approaches

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Paper: The introduction of environmental impact assessment in the 1970s led to the systematic consideration of environmental effects associated with development projects. The principal change was the introduction of mitigation measures to reduce adverse effects on the environment. From this evolved processes to incorporate environmental factors at earlier stages in the project development process through approaches like strategic environmental assessment, and, at later stages to ensure compliance with commitments through environmental management plans and environmental audits. However these approaches to incorporating environmental factors are in response to development proposals. They have reduced but not eliminated adverse environmental effects. If we are to achieve sustainable development there is a need to go beyond reactive approaches. This involves generating proactive strategies for environmental improvement together with economic and social development. The concept of regional sustainability strategies, such as the Canterbury Water Management Strategy and the Canterbury Biodiversity Strategy, are examples of trying to reverse the trends of ongoing degradation.

Introduction

This paper discusses the evolution of environmental instruments from the emphasis on mitigation in environmental impact assessment to an emphasis on sustainability in regional sustainability strategies, and the implications of these changes for the environment profession.

The paper initially describes the introduction of environmental impact assessment and its role in mitigating adverse environmental effects of projects. It then describes the expansion into project operations with environmental audits, and considering developments in their regional context through site selection and rehabilitation EIA and state of environment reporting.

The next stage of the evolution of environmental instruments that is identified is the introduction of strategic environmental assessments bringing environmental considerations into decision making at an earlier stage in the development process.

However effects-based legislation from which these instruments were drawn has not stopped the progressive degradation of the environment. This has led to the concept of regional sustainability strategies as a proactive approach to sustainable development rather than the reactive approach of EIA in response to development proposals. The example of the Canterbury Water Management Strategy as a regional sustainability strategy is described. Then the application of the Resources/ Processes/Outcomes/Response approach to the sustainability of operational activities in Canterbury is also presented.

The evolution of environmental instruments from mitigation to sustainability is summarized and the implications for environmental professionals of the change to proactive sustainability approaches from reactive assessment processes are explored.

Introduction of Environmental Impact Assessment

A major change in environmental decision making occurred in 1969 with the passage of the National Environmental Policy Act in the USA.[1] This Act introduced a new requirement for US Federal government agencies proposing an action. This was the preparation of an environmental impact statement.

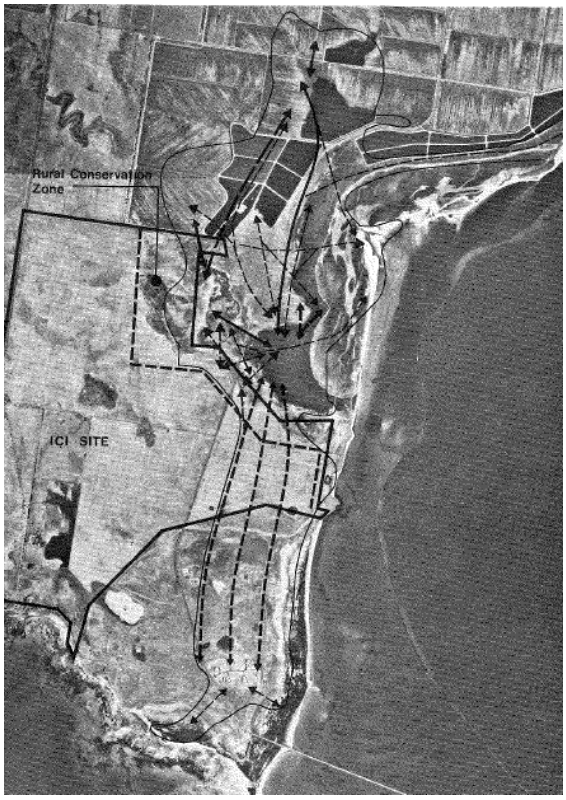
This required the responsible official to prepare a detailed statement on:

(i) the environmental impact of the proposed action,
(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
(iii) alternatives to the proposed action,
(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.[2]

While the initial documents under the legislation were short and uninformative, legal action by environmental interest groups led to the preparation by proponents of substantial documents describing the environmental effects of proposed actions.[3]

The concept of environmental impact assessment and effects-based management spread internationally. While the procedures vary from country to country the introduction of a mechanism to consider the environmental effects of proposed

[1] National Environmental Policy Act of 1969, Public Law 91-190 91st Congress S.1075, Jan 1 1970.
[2] NEPA Sec 102(c).
[3] Green, Harold P (1972), The National Environmental Policy Act in the Courts, The Conservation Foundation, Washington DC. Andrews, Richard NL (1972), Environmental Policy and Administrative Change: The National Environmental Policy Act of 1969, 1970-71, PhD Dissertation, University of North Carolina, Chapel Hill, NC.



actions was a major shift in introducing environmental factors into development decision making.

Australia and New Zealand introduced their own variants of effects-based legislation. The first Environmental Effects Statement in the State of Victoria was in the late 1970s. ICI were looking for the site for a new petrochemical plant as their Botany plant in Sydney was now surrounded by urban development and further industrial development on the site was severely constrained. They identified a site at Point Wilson near Geelong which was surrounded by the Werribee sewage farm, Avalon airfield and an explosives reserve.[4] This site would never be surrounded by urban development. However the area included the prime wintering habitat of the Orange-bellied Parrot, a rare and endangered species with about 100 birds remaining.

The outcome demonstrated the incredible value that timely environmental impact assessment can have. The critical habitat areas and flight paths of the parrot (Figure 1) that needed to be protected as well as the size of the buffer zones to avoid disturbance effects were identified.[5] Based on the environmental advice, ICI redesigned the facility layout so that a conservation reserve could be established. The petrochemical plant did not proceed for economic reasons but the 300ha Spit Conservation reserve has become the cornerstone of the programme for conserving the Orange-bellied Parrot.[6]

Environmental impact assessment can change projects. Much of the emphasis in the early days of EIA was on mitigation measures. Effects-based legislation in Australasia contains terms like "avoiding, remedying or mitigating any adverse effects of activities on the environment"[7] or "prevent, control and abate pollution and environmental harm"[8]. Effects-based legislation also created a new profession of environmental practitioners and a new professional association – what is now EIANZ.

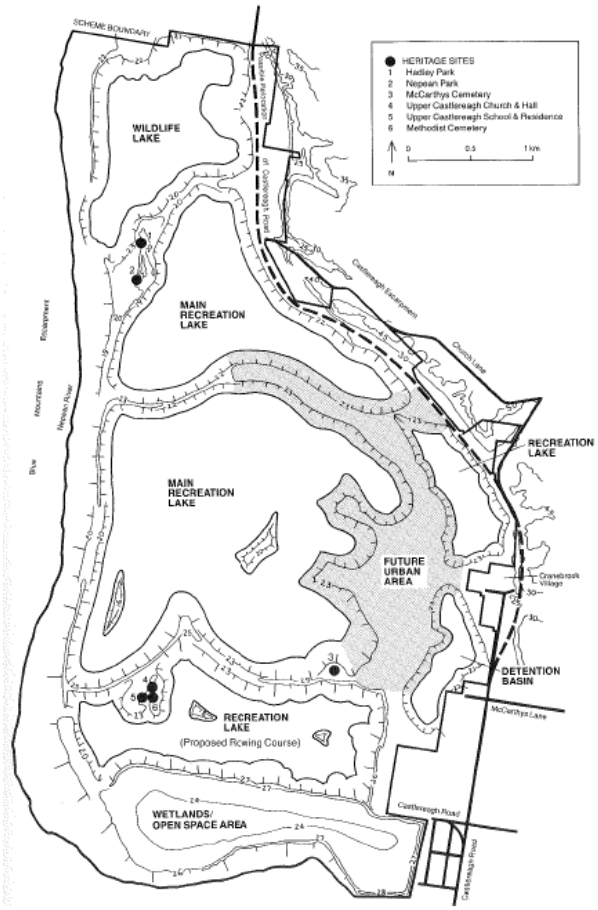
[4] ICI Australia (1978) Point Wilson Rezoning: Environmental Effects Statement, ICI Australia, Melbourne.
[5] Kinhill (1981) Avifauna Study ICI Point Wilson Development Progress Report: March to November 1980, Kinhill, Melbourne.
[6] Orange-bellied Parrot Recovery Team (2006) National Recovery Plan for the Orange-bellied Parrot (Neophema chrysogaster), Department of Primary Industries and Water, Hobart.
[7] South Australian Environmental Protection Act (1993)
[8] Western Australian Environmental Protection Act (1986).

Expansion to Operations and Regional Context

EIA typically led to conditions on projects. There were also pollution controls (in Australia) and consent conditions (in New Zealand) which led to operational requirements for projects. This further expanded the role of the environment profession as environmental managers and environmental auditors.

The focus was on development projects and industry operations. There were also examples that considered the relationship of projects within their regional context. One common example was EIA on site selection e.g. the site selection of the second Sydney Airport.[9] Another example was on rehabilitation after industry closure, e.g. the Penrith Lakes proposal[10] (see Box 1), including the management of contaminated sites.

Box 1: Penrith Lakes Scheme



The need to coordinate the extraction and rehabilitation activities on the Castlereagh floodplain adjacent to the Nepean River led to the development of the Penrith Lakes Scheme. At the time, the quarrying operations provided about 50% of Sydney's need for sand and gravel. The scheme covers an area of 1900ha and through rehabilitation of the quarried areas created a major water-oriented recreation resource. The project was the result of a Regional Environmental Study. The Statement of Environmental Effects addressed the impacts of the quarrying operations (e.g. noise and dust) and the development of the lakes (e.g. water quality, flood management and surface drainage).

[9] Department of Aviation (1985) Second Sydney Airport Site Selection Programme: draft Environmental Impact Statement, Kinhill Stearns, Sydney.

[10] Penrith Lakes Development Corporation (1986) Penrith Lakes Scheme Development Application 2 (DA2) Extraction and Rehabilitation Programme, Statement of Environmental Effects, Kinhill Stearns, Sydney.

Effects-based legislation does not require elimination of adverse effects. Instead we see terms like preventing "significant adverse effects on the environment"[11], conditions to address "material environmental harm"[12], or ensure adverse effects "are no more than minor"[13]. This allows small adverse effects for projects that are approved. The cumulative outcome is for ongoing degradation of the environment. Many jurisdictions in Australia and New Zealand also have environmental protection policies that set environmental limits for environmental outcomes. However effects-based legislation allows for extraction or discharge up to the limits.

Another environmental instrument, State of Environment Reports which performed the equivalent of environmental audits at the region, state or national level demonstrated ongoing degradation of the environment. The reports were based on the "Pressure-State-Response model" from the OECD[14] but the emphasis was primarily of the "state" component.

Strategic Environmental Assessment

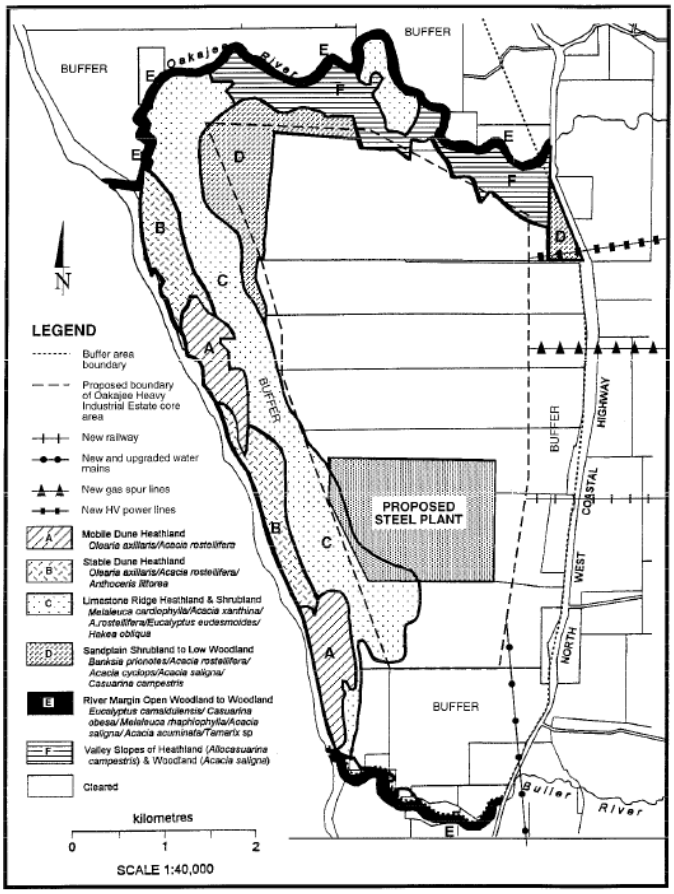
An evolution in environmental practice in order to bring environmental considerations earlier into the development decision making process was strategic environmental assessment. The term strategic environmental assessment refers to a systematic process of analyzing the environmental effects of policies, plans and programmes.[15] In Australasia, this was first introduced in Western Australia in 1995 as advice to the Minister. The Environmental Protection Act was amended in 2003 to allow formal assessment of strategic proposals.

One area where strategic environmental assessments were effective was in relation to managing environmental effects of industrial proposals. SEAs were conducted for industrial estates in areas where industrial plants were anticipated. This enabled identifying issues in advance of development proposals and allowed time for baseline studies and investigations of potential environmental problems as well defining appropriate buffer zones for issues like noise. Box 2 shows the siting of the Geraldton Steel Plant proposal within the Oakajee Industrial Estate. This facilitated the avoidance of sensitive environmental areas and the creation of appropriate buffer zones in advance of the steel plant proposal. It also enabled the undertaking of hydrological investigations to determine the acceptability of liquid waste treatment in an area of limestone.

[11] Victorian Environment Effects Act (1978)
[12] South Australian Environmental Protection Act (1993)
[13] New Zealand Resource Management Act (1991)
[14] OECD (2003) OECD Environmental Indicators: Development, Measurement and Use, OECD, Paris.
[15] Dalal-Clayton, B. and Sadler, B. (2005) Strategic Environmental Assessment: A Sourcebook and Reference Guide to International Experience, Earthscan, London.

Box 2 Oakajee Industrial Estate Strategic Environmental Assessment

Geraldton Steel Plant Proposal sited within Oakajee Estate avoiding sensitive vegetation and within designated buffers



The SEA for the Oakajee Industrial Estate provided early identification of sensitive environments, buffer requirements and potential environmental problems. One concern was in relation to wastewater disposal over Tamala limestone with karstic cavities. Hydrogeological investigations determined the permeability of sediments and underlying limestone groups, and, the absence of paleochannels. Adequate land area was identified for solar evaporation of liquid wastes.

The subsequent proposal could be sited to avoid sensitive vegetation and within adequate buffers that had been defined during the Strategic Environmental Assessment.

Sustainability Strategies

The general nature of all of the environmental assessment instruments is that they are a **reaction** to the consequences of development. A major departure from this position was the sustainability strategy for Western Australia.[16] This was a serious attempt for a **proactive** approach to environmental management in conjunction with economic development. One of the underpinning elements was the development of regional sustainability strategies.

There was a recognition that a new approach to development was needed. This is consistent with the influential summary of the concerns about the pathways for development that was in the World Commission on Environment and Development's report "Our Common Future". As stated in the introduction:

"We have in the past been concerned about the impacts of economic growth upon the environment. We are now forced to concern ourselves with

[16] Government of Western Australia (2003) Hope for the Future: The Western Australian State Sustainability Strategy, Department of Premier and Cabinet, Perth.

impacts of ecological stress – degradation of soils, water regimes, atmosphere, and forests – upon our economic prospects".[17]

The report, commonly referred to as the "Brundtland Report" after its chair Gro Harlem Brundtland, the Prime Minister of Norway, advocated the concept of sustainable development:

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs".[18]

The intent is that decision making anticipates and prevents environmental damage by incorporating these considerations at the same time as economic and resource use policies are being formulated. This requires proactive environmental restoration as well as earlier and more integrated consideration of environmental impacts compared to effects-based management.

The WA Sustainability Strategy set out a sustainability framework which consists of eleven principles, six visions and six government goals for sustainability action. It then set out what government agencies will do to give substance to the framework with respect to governance, global sustainability, natural resource management, settlements, the community and business. It included an Action Plan indicating how government agencies will contribute to sustainability. It was designed as a proactive document.

However the legislation to underpin the Sustainability Strategy was not enacted by the WA State Government. This left government agencies without the requisite support for the operationalization of the principles and actions in the strategy. Also the State Premier who had been the champion of the strategy resigned, the Sustainability Unit that coordinated strategy implementation across agencies was moved from Premier and Cabinet and the Sustainability Roundtable that brought agencies together was abandoned. The implementation of the strategy lost momentum.[19]

Canterbury Regional Strategies

In New Zealand the institutional arrangements are quite different. Resource management is more highly devolved to regional councils which have their boundaries based on water catchments. The Local Government Act Amendments in 2002 also gave local authorities the authority to "play a broad role in promoting the social, economic, environmental and cultural well-being of their communities, taking a sustainable development approach."

[17] The World Commission on Environment and Development (1987), Our Common Future, Oxford University Press, Oxford. p3.
[18] Ibid p42.
[19] Brueckner, M. and Christof, P. (2011) The rise and fall of sustainability in Western Australian politics: a review of sustainable development under the Western Australian Labour Government between 2001 and 2008, Sustainability Science, Practice & Policy v7 n2 pp3-17.

The Canterbury region took advantage of these provisions to develop a number of regional sustainability strategies. The Canterbury Water Management Strategy[20] was formulated because of the failure of the Resource Management Act to provide an adequate basis for managing irrigation development in the region. Sustainability limits were being reached in terms of water availability for both surface water withdrawals and groundwater abstraction, and in terms of land use intensification from irrigation with respects to impacts on water quality and freshwater ecology.[21]

The process was designed to be collaborative involving multiple stakeholders (rather than applicant-driven as in EIA).[22] The process was overseen by a multi-stakeholder group under the auspices of the Canterbury Mayoral Forum. The strategic framework was developed through stakeholder and community engagement (rather than as proponents and opponents in an EIA statutory process). It generated a shift from addressing water availability through storage on alpine rivers to a strategy to address targets for ten community priority issues related to water.[23]

Potential strategies to deliver on the targets were evaluated by sustainability appraisal which considered sustainability bottom lines for environmental, economic, social and cultural criteria and desirable top lines for the same criteria.[24] The sustainability appraisal found that:

- "business as usual" under the RMA did not achieve the sustainability bottom line
- A storage-led strategy scored well on economic criteria but not on environmental criteria
- An environment-led strategy opposed to storage until environmental issues were addressed scored well on environmental criteria but not economic criteria
- An efficiency-led option making water available from improved efficiency of currently allocated water thereby reducing contamination from surface water and groundwater leakage, scored above the sustainability bottom line on nearly all criteria.

The key outcomes of the sustainability appraisal for a regional strategy were that:

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[20] Canterbury Water (2009) Canterbury Water Management Strategy: Strategic Framework, Environment Canterbury, Christchurch.
[21] Jenkins, B.R. (2007) Water Allocation in Canterbury, NZ Planning Institute Annual Conference, Palmerston North 27-29 March 2007.
[22] Jenkins, B. R. and Henley, G. (2015) Collaborative Management: Community Engagement as the Decision-making Process, The Australasian Journal of Natural Resources Law and Policy v17 n2 pp 135-152.
[23] The ten issues were: ecosystem health/biodiversity, natural character of braided rivers, kaitiakitanga, drinking water, recreational and amenity opportunities, water use efficiency, irrigated land area, energy security and efficiency, regional and national economies, environmental limits.
[24] Jenkins, B. R., Russell, S., Sadler, B. and Ward, M. (2014) Application of Sustainability Appraisal to the Canterbury Water Management Strategy, Australasian Journal of Environmental Management, v21 n1 pp83-101.

- It is only possible to achieve sustainable development by considering existing uses of water as well as new uses and projects (i.e. EIA on new developments is not enough).
- The most economically viable source of additional water was from efficiency gains from existing users rather than storage (i.e. changes are required by existing users who have legal rights to water allocations from EIA processes).
- Environmental requirements were best met by improved land use practices of existing and new users (i.e. changes are required by existing users to management approaches accepted through EIA processes).
- There is no capacity for further land use intensification unless the cumulative effects of existing users are reduced (i.e. any adverse effect of new development exceeds environmental limits).
- There is a need for parallel development of environmental restoration with water resource development (i.e. proactive restoration is needed not just mitigation of adverse effects).

A collaborative community-based approach to the formulation of implementation programmes to deliver the strategy was established through ten Zone Committees of community members and runanga representatives, and a Regional Committee of multiple stakeholders.

One example of the proactive approach to the parallel development of environmental restoration is the "Immediate Steps Biodiversity" programme. The Zone Committees were to identify priority restoration projects within their zone and the Region Committee was to identify priority projects for the region. The projects were to be drawn from the Regional Biodiversity Strategy[25], another regional sustainability strategy for Canterbury.

The implementation of the strategy is still work in progress.[26]

Resources/Processes/Outcomes/Response Model

Key technical inputs to the strategy development process included a Regional Environment Report and predictions of the outcomes of alternative strategies. However the Canterbury Region Environment Report 2008[27] was set in a sustainability framework rather than a Pressure-State-Response framework. The environment represents one of four well beings under the Local Government Act: environmental, economic, social and cultural. The framework is based on a Resources/Processes/ Outcomes/Response model for sustainability. These components are dynamically interrelated. *Resources* provide the basis for *processes,* both productive processes and pressures on the environment. *Outcomes* of processes can also be productive

[25] Environment Canterbury (2008) A Biodiversity Strategy for the Canterbury Region, Environment Canterbury, Christchurch.
[26] Jenkins, B. R. (2013) Progress of the Canterbury Water Management Strategy and some emerging issues, Agricultural and Resource Economics Society Conference, Lincoln University, 29-30 Aug 2013.
[27] Environment Canterbury (2008) Canterbury Regional Environment Report 2008, Environment Canterbury, Christchurch.

outcomes as well negative impacts on the environment. Outcomes can be linked by positive or negative feedback loops both to processes and to resources (Figure 3). *Responses* are the initiatives taken as a result of the outcomes observed.

Canterbury Region Environment Report 2008 covers the environmental components: the natural capital as the resource component, natural resource management as the process component, the environmental outcomes and the organisational responses to environmental issues. A complementary Community Outcomes Report[28] addressed the outcomes across all four well beings of sustainability: environmental, social, cultural and economic.

This Resources/Processes/Outcomes/Response framework is more holistic compared to the Pressure-State-Response model which is focused on the negative pressures, their adverse effects on the environment and how those effects can be mitigated.

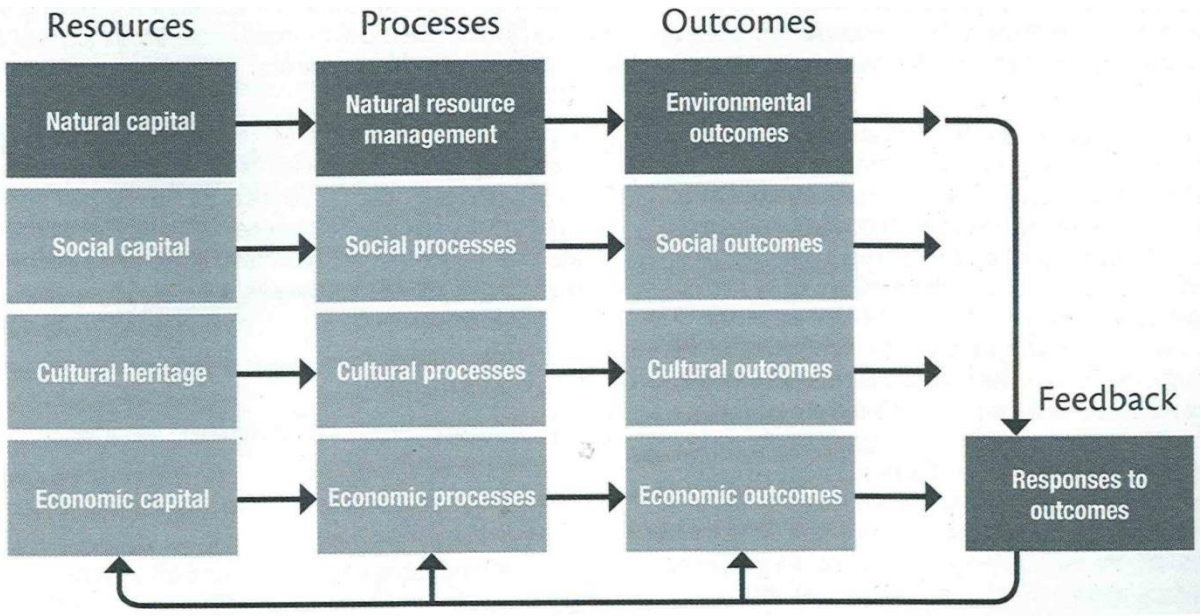

FIGURE 2: FRAMEWORK FOR REPORTING SUSTAINABILITY OUTCOMES

Evolution of Environmental Instruments

Table 1 sets out the key environmental instruments that have evolved since the introduction of project level EIA. This starts from the reaction to projects with EIA influencing project design and environmental management and audit influencing industry operations. There are instruments for putting projects into their regional context with EIA for site selection and environmental rehabilitation for project closure. There are instruments for regional strategic level assessment with SEA on development strategies and SoER on development pressures on the state of the environment. We are now seeing the development of proactive sustainability approaches with regional sustainability strategies for future development pathways

[28] Environment Canterbury (2008) Environment Canterbury Community Outcomes Report 2006-2008, Environment Canterbury, Christchurch.

and Resources/Processes/Outcomes/Response model considering operational activities from the perspective of all pillars of sustainability. This is an evolution from an emphasis on mitigation to an emphasis on sustainability.

Table 1: The Evolution of Environmental Instruments

	DEVELOPMENT ACTIVITIES	OPERATIONAL ACTIVITIES	
REACTION TO PROJECT	**EIA in Project Design**	**Environmental Management and Audit in Project Operations**	MITIGATION ▼ ▼ ▼ ▼ SUSTAINABILITY
PROJECT IN REGIONAL CONTEXT	**EIA in Site Selection**	**Environmental Rehabilitation**	
REACTION TO DEVELOPMENT STRATEGY	**SEA of Development Scenarios**	**State of Environment Reporting (PSR model)**	
PROACTIVE SUSTAINABILITY STRATEGY	**Regional Sustainability Strategy**	**Resources, Processes, Outcomes, Response Model**	

Implications for Environmental Professionals

This evolution from mitigation to sustainability has significant implications for the role of the environment profession. There will still be a need for environmental assessment and environmental management practitioners for project level involvement as well as regional SEA and SoER. However, the shift to sustainability instruments brings a much greater integration requirement with other disciplines and the variety of community interests for creative problem solving rather than reactive assessments.

One of the significant changes is the shift from independent assessments to interdependent decision making. A significant safeguard of environmental instruments such as environmental impact assessment, environmental audits and state of environment reporting has been the independence of the professionals undertaking the role external to the decision making process.

However environmental instruments such as proactive sustainability strategies requires environmental professionals to be actively engaging in the decision making process and working with proponents and opponents of different approaches to deliver sustainable development. While collaborative approaches can lead to creative solutions[29] there can also be the need for compromise in reaching decisions to deliver multiple outcomes inherent in sustainable development.

[29] Jenkins B. R. (2013) The Development of Sustainable Alternatives to Applicants' Proposals using Collaborative Approaches, NZ Planning Institute Annual Conference Hamilton, 30 Apr - 3 May 2013.

These differences in approach reflect two recent developments in thinking about democracy. One is monitory democracy based on the independent scrutiny of government decision making[30] (i.e. the EIA / environmental audit approach). The other is the deliberative democracy based on the concept of authentic representation of different viewpoints, inclusion of all affected interests, and consequential influence on outcomes.[31]

The need for safeguards associated with independence are familiar to environmental professionals and well reflected in EIANZ's code of ethics. However the safeguards for interdependent decision making are less well known. The key elements for a deliberative system are:

- Public space for free-ranging and wide-ranging communication,
- Empowered space for connecting the public discussions to institutions empowered to make decisions,
- Transmission of the public discussions to the decision making institution,
- Accountability of the institutions to the public deliberations,
- The organisation design of the system to facilitate deliberation, and
- The degree to which these elements determine the content of collective decisions.[32]

This shift from independent assessments to interdependent decision making creates some exciting challenges for the future of both environmental professionals as individuals and EIANZ as their professional association.

Conclusions

This paper has described the evolution of key environmental instruments from project EIA to regional sustainability strategies. While effects-based legislation is powerful in mitigating adverse effects of projects, it is insufficient when sustainability limits have been reached. There is then a need for proactive regional strategies to address sustainability limits rather than reactive assessments of new developments. This changes the role of the environmental professional from independent assessor to interdependent decision maker. To perform this role effectively there is a need for the safeguards based on deliberative democracy: authentic representation and inclusive processes that influence outcomes.

[30] Keane, J. (2009) The Life and Death of Democracy, Simon & Schuster, London.
[31] Dryzek, J. (2010) Foundations and Frontiers of Deliberative Governance, Oxford University Press, Oxford.
[32] Ibid.