INTEGRATED ENVIRONMENTAL MANAGEMENT: TOWARDS A FRAMEWORK

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INTRODUCTION

Integrated Environmental Management (IEM) stands for an approach to the management of the environment that takes into account its complex, multi-faceted, and interconnected nature. IEM represents an effort to come to grips with the enormous complexity and potentially all-encompassing character of the "environment" concept. It is based on a recognition that "the environment" is an indivisible whole (sometimes referred to as a system) which cannot be split into self-contained spheres, areas, or compartments. Events in one "location" within the environment can have repercussions across a wide spectrum of other things: "everything is connected to everything else". IEM, in short, acknowledges the need for what is often referred to as a more holistic approach to the environment and its management.

Although the *ecosystems approach* has provided a theoretical basis for the integrated environmental management of the non-human environment since the 1930s, the roots of IEM are not primarily theoretical or philosophical. More integrated approaches to environmental management can be traced to an acknowledgement of the failure (or limited success) of fragmented or sectoral environmental management in the past: many environmental problems have grown worse and new ones have emerged. Air pollution may have been turned into land or water pollution problems (pollutants shifted from one "medium" to another), and the effects of power generation (energy resource management) on ecosystems may change--but not necessarily be less significant--with a change from one energy source to another (for instance, from coal to nuclear power, or from oil to hydro or vice versa), and the conservation of nature (e.g. indigenous forests) may lead to an increase of problems associated with the use of other resources (such as chemically treated pinus radiata grown in mono-cultures). Such limited successes or failures (shifting or displacing problems more than resolving them) have led to a recognition that environmental management can only be more effective if the multiple connections (if not causes) of environmental problems, and the multiple effects of actions directed at them, are more comprehensively mapped and addressed.

IEM, although described here as an (one) approach to environmental management, encompasses a broad range of initiatives, efforts, and activities, ranging from, for instance, environmental (impact) assessment, systematic risk assessment, integrated pollution control, and (strategic or comprehensive) environmental policy & planning. IEM, then, stands for a diversity of activities, methods and techniques, and is (as yet) not based on one coherent body of theory. IEM efforts have started from different areas of environmental management (such as pollution control, planning, or pest control), and have developed largely independently from each other, even to the extent of becoming new disciplines in their own right (such as social assessment, risk assessment). Ironically, IEM efforts, although all aspiring to bring about a higher level of integration to environmental management, suffer from a lack of integration themselves. Environmental management

theorists and practitioners often pursue their own form or notion of integration, without even knowing about one another's efforts or recognising that these are all part of a broader enterprise called IEM.

The lack of integration in efforts to make environmental management more integrated is not surprising nor *necessarily* a bad thing. Almost by definition, a *completely* integrated approach to environmental management is impossible; although everything may be connected to everything else, we cannot *know or understand everything*, nor can we *do* everything at once. By approaching the need for integration from different angles, insights, and practices, we learn about the many different ways in which environmental phenomena are interconnected, uncovering a broader range of interrelationships within the environment in all its complexity. Also, a diversity of IEM efforts may reveal a variety of starting points for *action* regarding complex environmental problems: given the numerous connections lurking behind these problems, where do or can we *begin* tackling them most effectively? As we are not able to provide an answer to this question upfront--given the absence of an overarching and proven theory of all interrelationships or the environment as a whole--a diversity of approaches and practices within IEM can be seen as valuable to learning about the environmental *and* management web. To better address environmental problems, we have to be more comprehensive in our approach to environmental management but given our limitations (we are not God-like creatures) we can be only modest in our claims to know *how* to achieve it.

Yet, even though (or particularly because) we do not have at this stage *one* theory, and cannot prescribe *one* set of practices to achieve integration in environmental management, there is much to be gained in bringing together ideas and practices that have been developed so far. By identifying and discussing the various approaches towards IEM, we may learn about what they (portend to) integrate, how effective they have been, their relative strengths and weaknesses, and how they (may) fit together. Only if theorists and practitioners of the various "IEM schools" are prepared to communicate among, and learn from, each other, can we hope to arrive at a more integrated and effective approach to IEM. Even though it is probably unrealistic to expect that this will lead to the formulation of a theory of IEM, it is important as a means for the development of a meta-theory of IEM--a framework for directing and/or combining further efforts, theoretical and practical, towards integration.

THE IEM MATRIX

One way of charting the diversity of approaches towards IEM is to bring them together in a matrix: the IEM matrix. The vertical axis of the IEM matrix represents "the environment" in a broad sense. Along the horizontal axis, a variety of efforts and approaches to IEM are represented, classified into three broad groupings: (1) *Integrated Interpretation* efforts, primarily directed at integrating information and knowledge about, and understanding of the environment (including multi- and interdisciplinary analysis); (2) *Institutional Integration* efforts, directed at integrating institutions (organisations, rules, procedures) for environmental management; and (3) *Policy Integration* efforts, directed at formulating more integrated policy for managing the environment.

The Environment Axis

Along the vertical axis, the environment is represented as an integrated, holistic concept, comprising interdependent ecosystems or nature, including people. The ultimate challenge of integrated environmental management is to manage all human action whilst considering the environment "as a whole", taking into account the interconnectedness between plants, animals, climate, water, soil, minerals, people and all the other components, categories or elements, that we may associate with the environment concept.

THE IEM MATRIX

MANAGEMENT ENVIRONMENT	INTERPRETATION	INSTITUTIONS	POLICY	IEM
LAND				
WATER				
AIR				
PLANTS				
ANIMALS				
RESOURCES				
PEOPLE				

However, philosophically and/or practically, particularly since the ascent of western culture, people have tended to deal with the environment in components or compartments, even to the extent of dissociating themselves from it altogether. Land, water, plants, animals and other components (labelled resources) came to be used (and abused) separately from each other, often without recognising (or knowing about) their interdependence, with more or less apparent forms of environmental destruction as a result. Such separate treatment (of resources) even continued when the concepts of environment and environmental management found wide currency in the 1960s and 70s. Depending on the local history and definition of environmental problems, environmental management in countries took a form in which pollution (human health) concerns, the degradation of resources, and the threat of extinction to plants or animals, received variable emphasis.

Although IEM aspires to overcome the compartmentalisation of environmental management, this does not imply that it is desirable (if at all possible) to do so without any form or degree of categorisation and conceptual fragmentation. Recognising the interdependence between land, water, air, plants, animals and people, does not require abolishing such concepts. On the contrary, much more refined concepts or labels for components of the environment may be required to demonstrate precise forms of interconnectedness. For instance, we need words such as "ozone" and "chloro-fluoro carbons" or "CFCs" (instead of "air") to understand, let alone to be able to manage, a phenomenon such as ozone depletion. Obviously, the more complex and the larger the scale of human intervention in the environment, the wider the range of (interdependent)

environmental "components" that may be affected, and hence the more demanding IEM becomes.

How far we need to or should go into dissecting the environment concept in order to understand and manage the effects of human intervention is not simply a question of scale or complexity, however. What are sensible or "appropriate" environmental concepts or categories is also a cultural or philosophical (and hence political) question. From a cultural or philosophical perspective, it may be more appropriate to use more inclusive concepts (such as land, or water) to assess the effects or determine the parameters of, human action. What the environment is, and how (the effects of) human action should be managed in relation to it, is of course subject to interpretation and consequently socio-cultural, philosophical, ethical and political perspectives.

If we can never know all effects of all human interventions taken together, an assessment of environmental effects may be an inadequate or even poor guide for environmental management. Ironically, the more complex and unforeseeable the potential effects of (frequently science-based) human interventions (such as in the case of genetic engineering), the greater the need, role, and call for (non-scientific) philosophical and ethical considerations (categories) becomes apparent.

But it should of course be recognised that the latter *always* underlie (implicitly or explicitly) any human intervention in the environment--however simple or complex. For instance, assessing the disposal of human waste in a river may not be very complex or difficult, but it may be culturally unacceptable (as it is for Maori). Areas or resources may be declared off-bounds to human access or use because they are considered to be sacred or of intrinsic value. Whether such views and practices are rooted in a long-standing cultural tradition, or an expression of contemporary choice, is not the point. The point is that the identification and definition of environmental categories or concepts can be based on non-reductionist or non-analytical approaches. An integrated approach to the environment may involve more, or other than, a comprehensive assessment of potential effects: it may be inspired also or even primarily by philosophical and ethical considerations which find expression in inclusive rather than analytical categories and concepts regarding the environment.

The Management Axis

Along the horizontal axis of the EIM matrix are identified and classified those environmental management approaches that portend to be (more or less) "integrated" in their recognition of the interconnections within "the environment". In line with previous comments about the absence of one common and agreed-upon approach towards IEM, a number of ideas and practices can be identified. The only element that all these approaches have in common is that they are explicit and purposeful in their recognition of the need for a (more) integrated approach to environmental management. But they differ widely in what they set out to integrate and in how they go about it.

Broadly speaking, these approaches can be classified into three categories based on what they claim or try to integrate: (1) knowledge, information and interpretation of "the environment" and the effects

associated with human intervention; (2) institutional aspects of environmental management; and (3) policies.

Integrating Knowledge, Information, and Interpretation

The recognition that environmental problems are more likely to be effectively addressed if they are defined in a way which takes into account the diversity in possible interpretations and explanations, associated with differences in disciplines, knowledge and information, experiences, ideologies, socio-cultural perspectives and other frameworks people use in interpreting their environment, lies at the basis of a significant number of approaches. In various ways, using different methodologies and techniques, the focus of these forms of integration is on bringing together a diversity of views and interpretations as to what the problem is and how it could/should be addressed.

Environmental Impact Assessment (EIA), for instance, has been explicitly developed to extend ("enhance") the knowledge basis for assessing the potential impacts of proposals, requiring (in the US) assessment on the basis of multiple disciplines. But apart from enhancing the rationality (knowledge/information) basis for decision-making, it also usually allows for public scrutiny and input, enabling people to bring forward their values and views regarding a proposal. In the course of the last twenty-five years, many countries have adopted EIA systems, with New Zealand now allegedly leading the way by having introduced one of the most comprehensive systems.

Other approaches that bring together knowledge, information, and different interpretations of environmental problems can be found in ecosystem modelling, Geographic Information Systems (GIS), the development of State of the Environment Reporting (involving a variety of indicators), Environmental Auditing, Social Assessment, (Systematic) Risk Assessment, and Cost Benefit Analysis. All of these cover a different range of aspects or components of "the environment", with some focusing more on the physical environment (such as ecosystems modelling), others on the social environment (such as Social Assessment), and some (such as EIA) potentially both. However, none of these can claim to be "totally" comprehensive, bringing together all knowledge, information, and possible interpretations.

Nor is it the pretence of any of these approaches to be totally comprehensive. The differences in coverage and comprehensiveness of these approaches reflect disciplinary origins and associated perspectives and techniques, but also the different functions or purposes in the context in which they are used. For instance, EIA has been primarily used for assessing the (potential) effects of projects and much less of policies. Risk Assessment has mainly focused on identifying and measuring potential harm to humans and human artefacts (health, damage to property), and much less to other species or ecosystems as a whole, serving primarily political and economic purposes (avoiding potentially huge costs or repercussions associated with negligence; setting political priorities). State of the Environment Reporting (SER) also serves political purposes, with indicators selected primarily for their relevance to policy. Cost Benefit Analysis, with its roots in economics, also has limitations in its coverage of environmental aspects and functions.

When addressing existing or potential environmental problems, the challenge is not to (try to) apply or combine all these approaches (in other words, to be totally comprehensive), but to use those approaches that seem contextually most appropriate, feasible and effective. For instance, in the context of a conflict about the protection of an ecosystem, it is likely to be more appropriate and helpful to use environmental impact assessment (including social aspects) rather than risk assessment. When many people express environmental concerns of a qualitative or ethical nature (such as related to the quality of life in an urban environment, or the moral aspects of new technology), it seems less appropriate to rely on approaches that heavily rely on objectification and quantification. In most situations, factors associated with available time and resources, including access to technology and expertise, will impinge on the type of approach that can be taken.

What all this comes down to is informed judgement, based on the one hand on what the various approaches can offer, and on the other on what seems right or best given the constraints and opportunities of the context. At the same time, we need to somehow ensure that the approach that we take covers or addresses the essence of concerns. Obviously, the chances of making wiser decisions in this regard are enhanced if more people (representing a diversity of disciplines, perspectives, and experiences) are involved in the process. This brings us to a second category of approaches to integrated environmental management.

Integrating Institutions

The term institutions covers a wide range of things that guide the process by which decisions and policies are developed, including formal and informal rules, traditions and conventions, constitutions, processes and procedures, organisations, the allocation of responsibilities and powers, mandates, and guidelines. In short, institutions are relatively stable and entrenched structures and processes through which management in a broad sense (including policy development) occurs.

Since the emergence of the environmental problématique in the 1960s, most countries have changed and developed their institutional framework for environmental management, in many cases by allocating responsibility for the environment or a particular component thereof--such as pollution affecting human health--to existing or new government agencies (In New Zealand, the Commission for the Environment). In most cases, the changes did not involve a fundamental overhaul of institutional arrangements, and many rules, processes and responsibilities for environmental management remained largely intact.

Throughout the 1970s and 1980s, institutional frameworks for environmental management have been changed incrementally but often significantly (for instance, by the introduction of many new pieces of legislation and associated responsibilities). As a result, the institutional arrangements in many countries have become more complex and unwieldy and suffer from fragmentation, lack of transparency, overlap and contradictions, tensions, gaps, inefficiency, ineffectiveness, and spiralling costs. Almost inevitably, this led to demands and initiatives for institutional reform. In many cases, these demands have been fuelled also by environmentalists who see an important

reason for continuing environmental deterioration in the weakness and inadequacy of environmental institutions. This view has been supported by environmental analysts who question the ability of existing political institutions to deal effectively with the fundamental nature of the environmental problematique and challenge.

Often, the reform of environmental management institutions has taken the form of, or aspired to, establishing a higher degree of integration. However, also in this area, there has been a diversity of approaches. Some of these are:
(1) The integration of a broader range of responsibilities and powers into central government environment agencies;
(2) Efforts to improve coordination between organisations with environmental responsibilities (including the introduction of EIA systems);
(3) The integration (consolidation) of environmental legislation and decision-making procedures (with the RMA in New Zealand being a prime example);
(4) The devolution of (many) environmental responsibilities to lower levels of government;
(5) The integration of environmental and economic decision-making (by various means, including economic instruments);
(6) The integration of a broader range of knowledge, views and values in institutional decision-making regarding the environment through the introduction or extension of public participation provisions.

To varying degrees, all these approaches have also been pursued in New Zealand. Yet, this does not mean that the institutional framework for environmental management now is perfectly integrated and that problems in this area no longer exist. Even though the framework for environmental decision-making and management now has far greater integrative potential than a decade ago, with a broader range of environmental aspects, components or interests being considered concurrently instead of sequentially, there is still considerable scope for improvement. Still, many decisions with significant (potential) environmental impact--notably in the realm of economic policy and private sector investment--are not subject to institutional arrangements promoting or requiring consideration to be given to environmental interests. Also, doubts have been raised about the extent to which environmental concerns of a social (notably urban) character require consideration under the Resource Management Act. With decision-making regarding crucial resources (such as energy resources) now largely left to "the market", the integration of environmental concerns in this area is at least as problematic as in the past. And in some areas, such as pollution control, the management of hazardous substances, and waste management, there are still significant gaps in the institutional framework and capabilities.

But even if the institutional framework would be "perfectly integrated" on paper, this does not mean that integration would also be perfect in practice. The significance of rules, mechanisms for coordination, provisions for public participation, and other institutions lies in large part in the way they are *implemented*. Rules and requirements are meaningless if not adhered to and if they are not backed up by commitment and capabilities (including resources). Environmental agencies may have impressive responsibilities or power on paper but be

toothless or ineffective in practice. Environmental legislation may be highly integrated, but what it all means is of course dependent on how the law is applied and interpreted.

These qualifications highlight the importance of political, economic and social reality behind institutions. Almost inevitably, institutions--and/or the way they are implemented--reflect the relative strengths of values, views and interests in society, and are therefore almost always inherently conservative or conservatively implemented. Consequently, also, institutional reform, particularly if threatening strong and vested interests, is usually highly problematic and always political.

This is not meant to downplay the importance of institutional reform and integration for environmental management. Institutions often are significant sources of power and change in themselves, and institutional reforms requiring or promoting greater consideration to be given to a wider range of environmental interests, can contribute to bringing about significant change in attitudes and practices. Institutional reforms that strengthen environmental advocacy (in agencies or from the public) are also important in creating a more level playing field. But when assessing institutional arrangements or proposals for reform, careful attention needs to be paid to the underlying issues and forces referred to above to avoid taking formal arrangements for reality.

Whether institutional arrangements are adequate for ensuring or promoting IEM, or what improvements should be made, is therefore largely dependent on one's analysis and assessment of practices and their associated political, economic, and social reality, and not only of a study of formal structures and processes. Models or theories for institutional integration are of limited value in this respect, and the six approaches to improving the institutional framework for IEM should not be seen as straightforward recipes or remedies. Given the highly political nature of institutions and institutional reform, the question of what approach should be taken depends as much on political judgement as on an assessment of theoretical merits.

Integrating Policy

A third avenue via which IEM has been promoted is based on the development of (better) integrated policy. Almost all policies--but certainly economic, agriculture, transport, and energy policy--have potentially important environmental ramifications, even though many are not usually considered to be environmental policies. But even within the realm of what is more properly regarded as *environmental* policy--such as pollution control policy and land use policy--policies have often been developed independently from each other, often with the result referred to earlier: a shifting of problems rather than their resolution. Fragmented policy development can also lead to the negation of success in some policy areas (for instance, a policy promoting private transport may well negate achievements in CO2 reduction or pollution control), a waste of resources, and even a worsening of environmental problems and degradation (for instance, when substitutes are used for chemical pest control that prove to have even more serious environmental effects).

One of the first areas in which the importance of integrated (environmental) policy development has been recognised is in the area of pollution. *Integrated Pollution Control* (IPC) policies have been

developed in various countries (other than New Zealand) where it was realised that it did not make much sense to toughen air pollution standards whereas the regulation of water pollution remained lax, or vice versa. IPC is a policy approach where the goal or intention is to identify the "least harmful" way to dispose of pollutants--accepting that some level of pollution is likely to be technically or practically inevitable--whether in water, air, land, or given available treatment methods. This "best practicable environmental option" (BPEO) approach contrasts with the "best practicable means" philosophy which allows for economic considerations to be given important weight.

The integration of pollution control policy on its own has only limited integrative potential, however. Its effectiveness is easily compromised if the sources of pollution, such as the continuing production of new chemicals and products with potentially damaging environmental effects, are not addressed. Also, the growing scale of production and consumption associated with economic growth can easily negate the gains achieved by IPC (as is happening in Japan and other highly industrialised countries).

That environmental policy development (and implementation) needs to encompass a much broader approach to policy development is recognised in an increasing number of countries that have embarked on the development of comprehensive environmental policies or plans (also referred to as "Green Plans"). Leading the way in this are the Netherlands and Canada. In New Zealand, the *Environment 2010 Strategy* can be regarded as a step in this direction.

Integration of policy involves the development of policies in a way that their *substance* (principles, goals, and objectives) is brought into line with each other. The idea is to avoid that policies which impinge on the same issues, problems or policy areas (components of the environment) conflict with each other, in the sense that they pursue goals or objectives that are incompatible or even negating each other. IEM by policy sets out to formulate principles, goals and objectives across a spectrum of issues, problems and policy areas that are compatible at the least and reinforce each other in the pursuit of common goals at best. Because of its focus on the *substance* of policy (as distinct from process) it can also be referred to as *substantive coordination* (as distinct from *procedural coordination*).

Integration of policy substance is highly problematic for many reasons. Obvious barriers relate to the difficulty of reaching agreement on principles and goals, given the diversity of values and interests in society. Associated with that is the tendency of efforts to integrate substantive policy to result in the formulation of very broad and vague principles or objectives (that everyone can agree with) with little meaning (other than symbolic) in practice, and allowing a continuation of different, incompatible or conflicting, interpretations and practices (the notion of "sustainable management" as the principal goal of the Resource Management Act can be seen as an example of this problem). Comprehensive policy or planning is also subject to the difficulties and critique associated with *rational-comprehensive policy* development, dismissed as “pie in the sky" by many policy analysts.

Yet, despite all these difficulties, it appears that the need for policy integration is increasingly recognised (after all, if environmental policy is to mean anything in practice, it will *have to* result in *substantive* results, such as a reduction in pollution etc.). And, if conceived of as a matter of *degree or level*, (more) comprehensive policy development is also feasible. In New Zealand, a prime effort in this direction can be found in the formulation of Regional Policy Statements, a requirement under the RMA.

WEAVING TOGETHER STRANDS OF INTEGRATION: IEM AS META-THEORY

As mentioned above, approaches to IEM are often pursued independently from each other. For instance, Environmental Impact Assessment has mostly been practised without consideration being given to the need for institutional and/or policy integration. Advocates and practitioners of Cost Benefit Analysis (CBA) often tend to treat CBA as the principal, if not only, form of integration needed when dealing with proposals. Institutional as well as policy integration has often been thrown into the too-hard basket. Institutional reform, when undertaken, is driven often by a narrow range of interests or motives (such as enhancing efficiency), without consideration being given to its impact on other values or goals (for instance, social and ecological).

This points to the need for developing a more comprehensive, if not overarching, framework for IEM itself. Although the various forms and approaches to IEM may all be important or useful on their own, they require a more encompassing approach to more fully utilise their potential, and to avoid waste and counterproductive outcomes. Interpretation and definition, institutional and policy aspects all have to be considered together.

But how to go about weaving these strands of integration together? Where to start, and how to proceed? It is obvious that no simple answer to these questions is available: there is presently no overarching theory or framework for IEM that tells us how to select from and/or combine the various approaches identified. So far, much of the thinking about IEM, as well as its pursuit in practice, takes place within, and on the basis of, a confined range of disciplines associated with the various approaches identified above.

Therefore, a first and crucial element towards a more encompassing framework for IEM is the need for it to be undertaken in interdisciplinary teams. This may not be a particularly new or revealing insight, but nevertheless, it appears rather difficult to achieve in practice. Apparently, many obstacles, associated with disciplinary attachment and identity, institutional factors, incentive structures, costs, time and other practical difficulties, continue to exist to the point that truly interdisciplinary efforts are still more the exception than the rule.

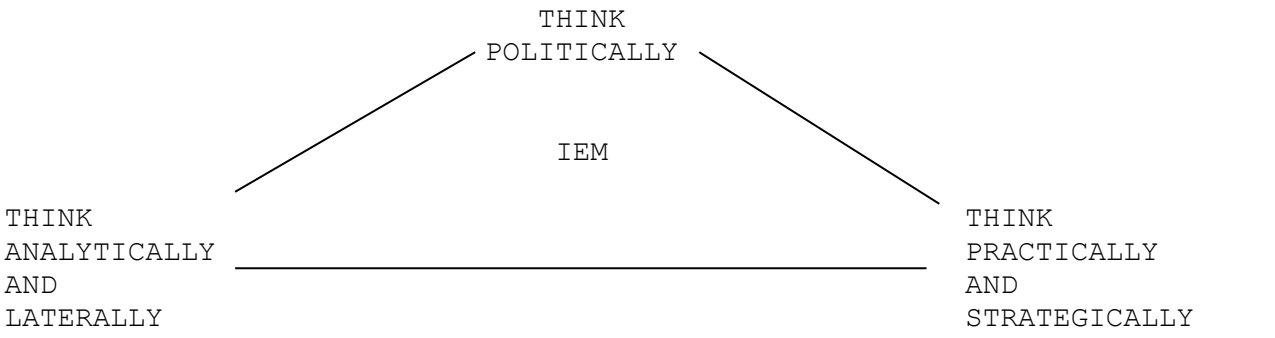
This point leads to the identification of a second important step towards a more encompassing approach to IEM, namely the need for its political and institutional facilitation. Building a more encompassing framework for IEM requires political commitment (from decision makers) and support (broader acceptance of its importance), to make available necessary resources, and to establish a supportive institutional framework (within universities, for instance, truly *inter*disciplinary

teaching is still exceptional and difficult because of disciplinary based departments, academic recognition being based on achievements within a particular discipline, and many practical and resource constraints). Interdisciplinary effort, and IEM in general, is still largely seen and treated as a *luxury*, not a *necessity*. The acceptance and facilitation of IEM depend very much on the extent to which its advocates and practitioners are successful in proving its value.

For all the reasons mentioned, it is not surprising that, on a practical and methodological level, the question of *how* to implement IEM is also not easy to answer. Nevertheless, a few points can be distilled from the discussion that can provide some guidance towards setting the first steps: (1) Think politically; (2) Think analytically and laterally; and (3) Think practically and strategically.

Think Politically

Whenever faced with an environmental problem or policy (that seems inadequate), identify who is (has been) involved, and affected, for what reasons (interests, values), and for what purpose (what is everyone trying to achieve). The significance of problems and policies stems from the role and perceptions of people (ecocentrism notwithstanding). If anything is to be done about a problem or policy, it will have to be done through people. Identifying who is involved and/or has an interest, and in what way, is a first step towards change.



Thinking politically is not only, or even primarily, an analytical exercise. Of course, some form of analysis (e.g. from a policy process approach) always underlies the interpretation of who is involved and how. But for IEM to be meaningful and practical, thinking politically also has to *engage those involved*: what people's values and interests are, what is acceptable, desirable, and feasible can best (if not only) be determined by people themselves (avoid paternalism and *ascribing* people's values and interests). Therefore, building up a realistic political picture around an issue or policy also means consultation, participation, and collective deliberation. If IEM is to mean more than a theoretical exercise (presentation of the "integrated" views of a small group of people--however interdisciplinary) and to avoid serving the interests of a selected few (usually the most powerful--"integration from above"), its political analysis will have to be open, participatory and inclusive.

Think analytically and laterally

IEM, like all management and policy, is inevitably based on some kind of analysis and underlying (explicit or implicit) theory. Whatever solution to a problem is tried, or whatever action is undertaken towards particular goals, there is always some idea or assumption as to *why that particular solution* or action (might) work. "Theory" in this context does not necessarily imply scientific methodology or analysis; it merely refers to all forms of explanation (other than arbitrary) on which expectations are based. In the context of IEM, thinking analytically *and* laterally refers to the need to think of as many possible interpretations and *explanations* of problems, taking into account interconnections between the "components" of the environment (within and between ecosystems, resources, and people). Crossing disciplinary boundaries is vital in this respect, but so is thinking along lines other than prescribed by science or any *single* methodology. It should be remembered that "when people think something is real, it is real in its consequences" (people do not think, feel, or behave according to any one model of rationality).

To improve understanding of environmental problems, analytical and lateral thinking needs to be applied across the whole spectrum of the environment (the vertical axis of the matrix), but also within and across all three broad categories of approaches to IEM identified: the analytical approaches (such as associated with EIA or risk analysis) themselves, the institutional framework, and the policy framework. Underlying all these approaches is some kind of idea or assumption ("theory") regarding the reasons for problems, inadequate management and policies. IEM (in a broader sense) aspires to provide a more comprehensive understanding of environmental problems and needs not only by looking at interconnections between the "components" of the environment, but also by assessing the methodology used in interpretation (including the role of disciplines, assumptions, techniques, values and ideologies), the institutional framework, and the substance (soundness) of policies. Moreover, it aspires to link these explanations to each other (for instance, how the decline of a species of bird is connected with a particular water pollution problem, which is physically linked with a particular form of land use, and with an inadequate approach used for assessing the physical and ecological effects of that use, which in turn may be linked to a gap or prevailing bias in the institutional framework, which finally may be linked with a permissive or weak policy regarding pollution overall). Obviously, the analytical challenge of IEM is formidable and therefore requires formidable cooperative and collective effort.

Think practically and strategically

Given the formidable nature of the challenge implied in a more comprehensive approach to IEM, it is important to add a third element: the need to think practically and strategically. As IEM cannot possibly mean being analytically totally comprehensive nor "doing everything", this third element is vital for avoiding over-optimistic expectations of its advocates (and other people), and "pie in the sky" accusations from its sceptics.

Thinking practically refers to the need to take into account, in a particular context--such as a Regional Council's position--constraints related to responsibilities, available time and expertise, human

capabilities, and other resources. Often, people and organisations are already stretched to the limit when it comes to what they can do and are expected to do. Just telling them to do another huge job, or that what they are doing is all wrong, is unlikely to lead to anything positive.

Strategic thinking is not a magic wand to overcome these constraints, but a means of trying to identify the best *starting points* for doing things better, often within the scope of available means. Given the connections between environmental components, interpretation, institutional and policy/political aspects, a strategic approach implies the identification of key factors or *pressure points* which can be most readily changed or manipulated and produce (a chain of) significant effects.

What these key factors or pressure points are, depends on a combination of analysis and interpretation, political and ethical judgement, and assessment of what is practically feasible. Experience, political intuition, and attitude are likely to play a role in these matters, as much if not more than scientific evidence about where the problem is coming from. What is considered feasible and desirable in a particular context is primarily a question of judgement, perhaps of art more than science or analysis.

For instance, whether environmental assessment, (more) research, (more) public participation, incremental (policy) change, (better) co-ordination, environmental education, the introduction of economic instruments, (radical) institutional reform, or a combination of these, is the "best" or most strategic approach to resolving Christchurch's air-pollution problem, depends on one's assessment as to what is *relatively* most easily (or least difficult) to do (change), *relatively* most effective or productive, as well as acceptable and desirable (regarding means as well as ends). Given its numerous linkages with all environmental components and potential roots in all aspects of management (from interpretation, institutions, and policies), but also given one's position, responsibilities, and available resources, views on what is (are) strategically the best starting point(s) are likely to differ. The ability to gain support for one's view (by persuasion or other means) is in itself an important strategic political skill and asset.

Strategic thinking as discussed here differs from the prevailing (and fashionable) use of the term as primarily associated with setting long-term goals and priorities (cf. *Environment 2010 Strategy*). In the context of EIM, interpreted as an effort towards developing a more encompassing (overarching) framework for environmental management than what has been achieved so far (within the three approaches identified), strategy focuses on *means* as much as on *ends*, but certainly encompasses both.

CONCLUSION

IEM can be conceived as an approach to environmental management which takes up the challenge to take into account the interconnections within the environment as well as those within management (in a broad sense, encompassing interpretation, the structures and processes guiding management, and policy, including implementation/action). Depending on the (number and kind of) distinctions made along both sides of the IEM

matrix, IEM presents a more or less complex net of intersecting dimensions (or components) of the environment and aspects of management.

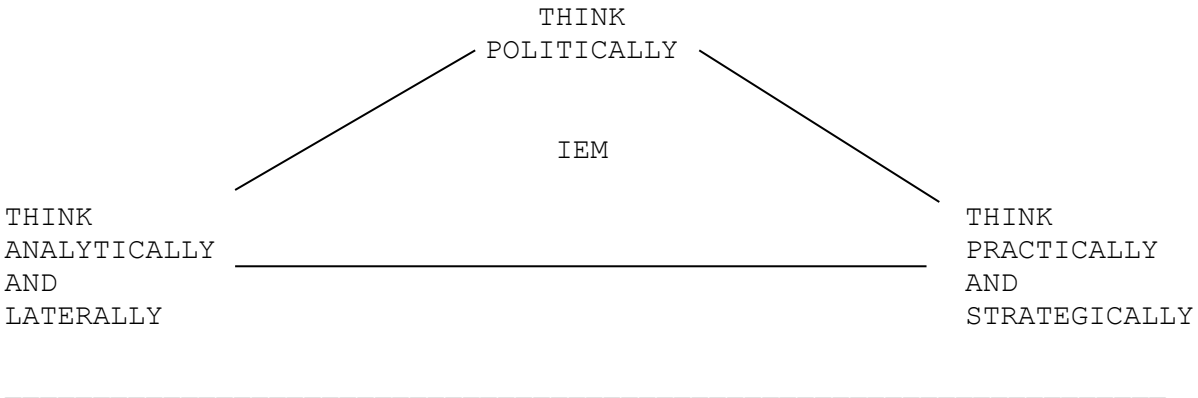
Ideally, all aspects of environmental management reflect or take into account the interconnectedness between all aspects of the environment. So far, however, most efforts towards IEM bring together aspects of management within a single category (for instance, associated with knowledge, information, and interpretation), and cover only a limited range of environmental components (for instance, pests, and ecosystems, but not people). IEM as defined here, aspires to achieve a higher level of integration in management by bringing together existing (sectoral) approaches to IEM into one framework or meta-theory.

The framework for IEM presented here (the EIM matrix) is only a basis for the development of further thinking and action regarding "what" and "how" to integrate. Important elements in that context are requirements to "think politically, think analytically and laterally, and to think strategically and practically". Perhaps the key notion among these is that of strategic thinking, which ties together the idea of more comprehensive management with the need to identify strategic starting points for effective change.

THE IEM MATRIX

MANAGEMENT ENVIRONMENT	INTERPRETATION	INSTITUTIONS	POLICY	IEM
LAND				
WATER				
AIR				
PLANTS				
ANIMALS				
RESOURCES				
PEOPLE				

IEM META-THEORY



INTEGRATION VIA INSTITUTIONS

ORGANISATIONAL INTEGRATION	EPA/IPC AGENCY
	DOC
	SUPER-MINISTRY?
CO-ORDINATION	HIERARCHICAL
	MUTUAL ADJUSTMENT
	COMMON GOALS
LEGISLATIVE INTEGRATION	IPC
	RMA
RULES/PROVISIONS REQUIRING OR PROMOTING INTEGRATION	EIA, RISK ASS. ETC
	PUBLIC CONSULTATION
	CONFLICT RESOLUTION/ MEDIATION
	REPORTING FUNCTION

INTEGRATION VIA POLICY (ENDS AND MEANS)

* IPC

* INTEGRATED WASTE MANAGEMENT STRATEGY

* INTEGRATED PEST CONTROL

* PLANNING

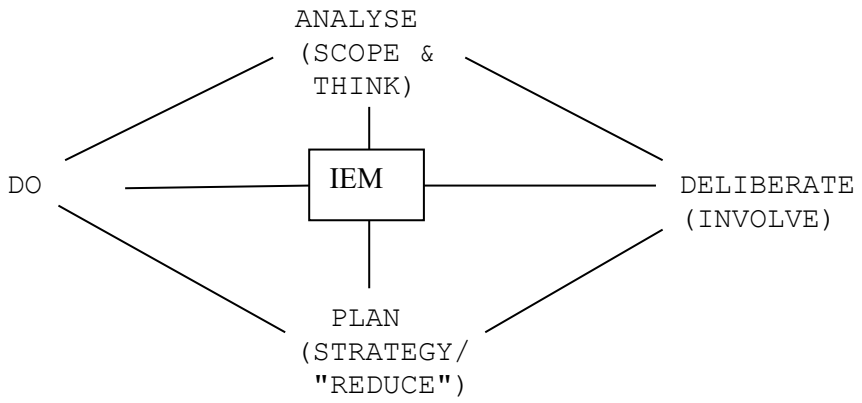
* POLICY PRINCIPLES ("SUSTAINABLE MANAGEMENT")

* "GREEN PLANS/STRATEGIES"

* ECONOMIC INSTRUMENTS
  - TAXES/INCENTIVES
  - MARKETS (POLLUTION RIGHTS)
  - RESOURCE ACCOUNTING
  - ENVIRONMENTAL AUDITING
  - ENV LABELLING ("ENV CHOICE")

* ENVIRONMENTAL EDUCATION/INFORMATION

IEM NET



FACTORS AFFECTING THE DESIGN OF AN IEM APPROACH:

* LEVEL OF UNCERTAINTY/KNOWLEDGE (WHAT KIND OF PROBLEM? SOURCE OF PROBLEM? APPROPRIATE ANALYSIS? PRESSURE POINTS?)

* DEGREE OF INVOLVEMENT/INTEREST/MOTIVATION/COMMITMENT (WHOM TO INVOLVE? METHOD OF INVOLVEMENT?)

* LEVEL OF (DIS)AGREEMENT/CONFLICT (FOCUS ON GOALS OR PROCESS? CONFLICT RESOLUTION/MEDIATION? INSTITUTIONAL REFORM?)