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Sustainability assessment: basic components of a practical approach

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Abstract: The last few years have brought many experiments with forms of sustainability assessment – applied at the strategic and project levels by governments, private sector firms, civil society organizations and various combinations.

The attractiveness of the work so far suggests that it is now time to prepare for comprehensive adoption and more consistent application of sustainability assessment requirements and processes. The key first steps in sustainability assessment regime design are addressed in this paper. They centre on

- the basic sustainability requirements that should inform a transition to sustainability assessment;
- the main implications of these requirements for sustainability assessment decision criteria and trade-off rules;
- how to incorporate proper attention to the specific circumstances of applications in particular cases and contexts; and more generally
- how to design practical sustainability assessment regimes.

Key words: sustainability assessment, sustainability requirements, integration, complexity, process design, decision criteria, trade-offs

Sustainability assessment: basic components of a practical approach

Sustainability assessment initiatives in various forms and under various titles are spreading rapidly in many parts of the world. Five yeas ago, a capable internet search engine would identify a few dozen government, corporate, academic, civil society and personal websites presenting work labeled as sustainability assessment or one of its equivalents. Recently (June 2006) Google reported over 26 million sites mentioning the term, and hundreds, if not thousands of distinct initiatives.

Some of the examples are Canadian, including the ground breaking assessment of the Voisey's Bay nickel mine and mill project on the north Labrador coast (Gibson, 2000). But there are many others. Hong Kong applies sustainability assessment in its evaluation of urban infrastructure options (HKSDU, 2002). The United Kingdom uses sustainability appraisal in regional planning (UK ODPM, 2005).

Several mining operations in Namibia and South Africa have been subject to sustainability-centred planning and assessment processes (Hacking, 2005). The World Conservation Union and the Forest Stewardship Council have well established sustainability-based processes for evaluating conservation and development undertakings and for decision making on forest product certification (Guijt et al, 2001, FSC, 2004).

Many private firms have been experimenting with forms of triple-bottom line assessment, which consider social and ecological as well as economic effects, and the North American metal mining sector has developed a "seven questions to sustainability" methodology to guide mine planning (MMSD-NA, 2002; Hodge, 2004). Municipalities have used sustainability frameworks for site level design of greener neighbourhoods (Alexander, 2001). The United Nations Development Programme has fostered sustainable livelihood approaches to community-level development assistance (Singh and Wanmali, 1998) and the European Community has supported sustainability-based evaluation of international trade liberalization options (Kirkpatrick and Lee, 1999).

In a recent study of approaches to sustainability assessment, Barry Sadler and Barry Dalal-Clayton (2005), expecting to find a chapter's worth of material, uncovered sufficient material for a book, and even then could only survey a selection of the many possibilities and efforts. Moreover, the many sustainability assessment efforts are accompanied by a much more extensive set of evidently serious attempts to define sustainability objectives, to identify appropriate indicators, to apply sustainability considerations in scenario-building, community mapping, multi-criteria evaluations,

lifecycle and flow analyses, and a host of other tools to assist decision making in complex circumstances.

These phenomena are not entirely new. Arguably, the idea and practice of considering the interrelationships among important concerns and influences, and looking beyond immediate results to implications for future generations, stretch back to the dawn of human experience. Until the invention of progress a few hundred years ago, most of human history was about the pursuit of sustainability (at least when it was not about the pursuit of conquest and glory). Today, however, the pursuit of sustainability is different. In a world of rapid change, specialized expertise, narrow mandates and immediate pressures, attention to interconnections and future generations is unusual. And attention to sustainability objectives is driven not so much by a desire to preserve tested traditions as by demands for improvements – to meet the challenge of providing decent livelihoods for all without wrecking the planet.

Essentially, the present concept of sustainability is a response to evidence that current conditions and trends are not viable in the long run, and that the reasons for this are as much social and economic as they are biophysical or ecological. As a result, current sustainability efforts are not merely integrative and forward looking. They are also attempts to push us onto a different and more hopeful path and as such they are an attack on entrenched habits and structures of decision making. This is true also of sustainability assessment initiatives, broadly speaking.

The vast diversity of sustainability assessment experiments includes a sizeable portion with tenuous claims to the category. As in the larger realm of asserted commitments to sustainable development, conceptual rigour and effective action are much less common than cheerful visions and passionate endorsement. Still there is good reason to believe that the great proliferation of sustainability assessment initiatives, including those of questionable merit, is a response to widespread and genuine pressures for more effectively comprehensive, farsighted, critical and integrated approaches to decision making on important policies, plans, programmes and projects.

We can anticipate a continuing spread of such efforts for several reasons. The costs and perils of unsustainable behaviour are becoming more evident at every level and both citizens and authorities are now increasingly aware of the interconnections among economic, social and ecological considerations. Moreover, governments and private sector organizations that have spent well over a decade making formal claims of devotion to sustainability are being pressed to act accordingly. And more positively, after lengthy contests over the meaning of "sustainability" and "sustainable development", there is now an emerging consensus on the fundamentals of what is needed for progress in the desired direction.

This paper outlines the basics of a practical generic approach to sustainability assessment. It relies on the past two decades of deliberations and experience with sustainability assessment initiatives, as a foundation for identifying

- the basic sustainability requirements that should inform a transition to sustainability assessment;

- the main implications of these requirements for sustainability assessment decision criteria and trade-off rules;
- how to incorporate proper attention to the specific circumstances of applications in particular cases and contexts; and more generally
- how to design practical sustainability assessment regimes.[1]

Sustainability concept basics

Sustainability as a recent idea arose in response to two big problems and a host of particular ones. The two big worries – the spreading gulf between rich and poor and the continued degradation of biospheric systems – are entwined in a vicious spiral that increasingly threatens the enormous achievements made in other fields. The numerous particular concerns have centred on the common and sometimes catastrophic failures of decision making efforts that failed to take key linked factors into account.

Some early versions of the concept (e.g. the UN's eco-development efforts in the 1970s) responded to the disappointments and tragedies of development assistance undertakings that had ignored local ecologies, cultures and capacities. Other versions (e.g. in the 1980 World Conservation Strategy) were the fruits of gradual experiential learning that there could be no species preservation without habitat preservation and no habitat preservation without local livelihood security.

Since 1987 when the World Commission on Environment and Development issued its report, *Our Common Future*, the terms "sustainability" and "sustainable development" have been widely, if sometimes cynically, embraced by public and private sector bodies. There has been much debate about the meaning and implications of serious commitment to sustainability and these deliberations continue. But after two decades of experimentation and study, there has been evident progress towards consensus on the fundamentals, supported by complementary developments in several adjacent areas of theory and practice.[2]

The following eight points are now safe assertions about the basic insights, at least for the purposes of sustainability assessment:

- Sustainability considerations are comprehensive, including socio-economic as well as biophysical matters and their interrelations and interdependency over the long term as well as the short.
- Precaution is needed because human and ecological effects must be addressed as factors in open, dynamic, multi-scalar systems, which are so complex that full description is impossible, prediction of changes uncertain, and surprise likely.
- Minimization of negative effects is not enough; assessment requirements must encourage positive steps – towards greater community and ecological sustainability, towards a future that is more viable, pleasant and secure.
- Corrective actions must be woven together to serve multiple objectives and to seek positive feedbacks in complex systems.
- Sustainability requires recognition both of inviolable limits and of endless opportunities for creative innovation.

- Sustainability is not about balancing, which presumes a focus on compromises and trade-offs. Instead the aim is multiple reinforcing gains. Trade-offs are acceptable only as a last resort when all the other options have been found to be worse.
- The notion and pursuit of sustainability are both universal and context dependent. While a limited set of fundamental, broadly applicable requirements for progress towards sustainability may be identified, many key considerations will be location specific, dependent on the particulars of local ecosystems, institutional capacities and public preferences.
- In the pursuit of sustainability, the means and ends are intertwined and the process is open-ended. There is no end state to be achieved.

These basic consensus points about sustainability can be translated quite directly into implications for sustainability assessment. Arguably there are four major components.

The first is that sustainability assessment processes must force decision makers contemplating potentially significant initiatives to give serious primary attention to sustainability requirements. To do this, the processes must apply decision criteria that establish meeting the core requirements for progress to sustainability as the main test of proposed purposes, options, designs and practices. And the processes must put application of these sustainability-based criteria at the centre of decision making, not as one advisory contribution among many.

Second, sustainability assessment must take seriously the obligation to recognize interdependencies and to seek multiple reinforcing gains on all fronts. This is assisted by setting a comprehensive agenda that covers the full suite of core requirements for moving towards sustainability. But it is also crucial to establish firm guidance for trade-off decisions – to ensure that sacrifices are made only where there is no viable less bad alternative.

Third, sustainability assessment processes must provide means of specifying the sustainability decision criteria and trade-off rules for specific contexts, through informed choices by the relevant parties (stakeholders).

Finally, sustainability assessment processes must apply these insights in the full set of process elements:
- identifying appropriate purposes and options for new or continuing undertakings,
- assessing purposes, options, impacts, mitigation and enhancement possibilities, etc.,
- choosing (or advising decision makers on) what should or should not be approved and done, and under what conditions, and
- monitoring, learning from the results and making suitable adjustments through implementation to decommissioning or renewal.

Decision criteria for sustainability

The core requirements for progress towards sustainability can be extracted without much difficulty from the rough consensus that has emerged from the past twenty and more years of debate and experimentation.

Perhaps most obviously, sustainability is a critical concept. Attention is paid to sustainability because the current situation and trends appear not to be viable in the long run. Also clearly, the viability problem is as much social and economic as it is biophysical or ecological. For some years there were lively debates about whether it is best to conceive of sustainability resting on two intersecting pillars (the ecological and the human) or three (social, ecological and economic) or five (ecological, economic, political, social and cultural), or more.[3]

But all this was essentially about emphasis. The important point is that all are included and that human and ecological well-being are effectively interdependent. Under all the layers of artifice and ingenuity, humans are ultimately and unavoidably dependent on biospheric conditions that are friendly to human life. And we now play a huge role in manipulating those conditions. Therefore, the overall systems that must be made desirable and lasting are not just ecosystems. They are socio-ecological systems. Sustainable development must aim to foster and preserve socio-ecological systems, from the family to the global levels, that are dynamic and adaptable, satisfying, resilient, and therefore durable.

Identifying the pillars has helped to underscore the mutual importance of the several factors. But defining sustainability needs in the familiar but separate categories of ecology, politics, society, economics and culture perpetuates fragmentation. Most participating individuals and agencies come to the sustainability table with particular areas of expertise, mandate and interest to apply and defend. Encouraging them to think and act outside these boxes is easier when sustainability is defined in ways that stress the interconnections and go more directly to the substance of what must be considered and done.

Bottom-up sustainability assessments, driven by the expressed public concerns surrounding particular cases or initiatives, often abandon the pillar categories and focus instead on problems and aspirations that cross the social/economic/ecological boundaries. Public issue identification and priority-setting processes typically identify secure livelihoods, safety, health, vibrant and attractive communities, new opportunities and choice, and influence in decisions as key objectives. None of these is a purely social, economic or ecological matter.

Sustainability assessment criteria that avoid the pillars, and concentrate attention on the main requirements for improvement rather than the established categories of expertise, are therefore advantageous. Many such approaches have been proposed and used. Some are not much more than eclectic lists,[4] and some fail to include all the important needs.[5] But there are still many that attempt to consolidate the full range of considerations from the most advanced thinking,[6] and their conclusions reflect broad agreement on the essentials.

The box below presents a set of basic sustainability requirements that should be considered the core obligations of sustainability-oriented decision makers. Following the approach suggested above, this set of requirements is not pillar-based, though the elements draw from the usual categories. Instead it concentrates attention on what must be achieved, and what key actions are involved, to move consistently towards greater sustainability. These requirements are framed here as criteria for sustainability assessments.

Box 1 Core Generic Criteria for Sustainability Assessments

Socio-ecological system integrity
the requirement
Build human-ecological relations to establish and maintain the long term integrity of socio-biophysical systems and protect the irreplaceable life support functions upon which human as well as ecological well-being depends.

illustrative implications:
- need to understand better the complex systemic implications of our own activities
- need to reduce indirect and overall as well as direct and specific human threats to system integrity and life support viability

Livelihood sufficiency and opportunity
the requirement:
Ensure that everyone and every community has enough for a decent life and that everyone has opportunities to seek improvements in ways that do not compromise future generations' possibilities for sufficiency and opportunity.

illustrative implications:
- need to ensure provision of key prerequisites for a decent life (which, typically, are not now enjoyed by those who have little or no access to basic resources and essential services, who have few if any satisfactory employment opportunities, who are especially vulnerable to disease, or who face physical or economic insecurity)
- need to appreciate the diversity, and ensure the involvement, of those whose needs are being addressed

Intragenerational equity
the requirement:
Ensure that sufficiency and effective choices for all are pursued in ways that reduce dangerous gaps in sufficiency and opportunity (and health, security, social recognition, political influence, etc) between the rich and the poor.

illustrative implications:
- need to build sustainable livelihoods for all, including practically available livelihood choices and the power to choose

• need to emphasize less materially and energy intensive approaches to personal satisfactions among the advantaged, to permit material and energy sufficiency for all

Intergenerational equity
the requirement:
Favour present options and actions that are most likely to preserve or enhance the opportunities and capabilities of future generations to live sustainably.

illustrative implications:
• need to return current resource exploitation and other pressures on ecological systems and their functions to levels that are safely within the perpetual capacity of those systems to provide resources and services likely to be needed by future generations
• need to build the integrity of socio-ecological systems, maintaining the diversity, accountability, broad engagement and other qualities required for long term adaptive adjustment.

Resource maintenance and efficiency
the requirement:
Provide a larger base for ensuring sustainable livelihoods for all while reducing threats to the long term integrity of socio-ecological systems by reducing extractive damage, avoiding waste and cutting overall material and energy use per unit of benefit.

illustrative implications:
• need to do more with less (optimize production through decreasing material and energy inputs and cutting waste outputs through product and process redesign throughout product lifecycles) to permit continued economic expansion where it is needed, with associated employment and wealth generation, while reducing demands on resource stocks and pressures on ecosystems
• need to consider purposes and end uses recognizing that efficiency gains are of no great value if the savings go to more advantages and more consumption by the already affluent

Socio-ecological civility and democratic governance
the requirement:
Build the capacity, motivation and habitual inclination of individuals, communities and other collective decision-making bodies to apply sustainability requirements through more open and better informed deliberations, greater attention to fostering reciprocal awareness and collective responsibility, and more integrated use of administrative, market, customary and personal decision-making practices.

illustrative implications:
• need governance structures capable of integrated responses to complex, intertwined and dynamic conditions
• need to mobilize more participants, mechanisms and motivations, including producers, consumers, investors, lenders, insurers, employees, auditors, reporters
• need to strengthen individual and collective understanding of ecology and community, foster customary civility and ecological responsibility, and build civil capacity for effective involvement in collective decision making

Precaution and adaptation
the requirement:
Respect uncertainty, avoid even poorly understood risks of serious or irreversible damage to the foundations for sustainability, plan to learn, design for surprise, and manage for adaptation.

illustrative implications:
• need to act on incomplete but suggestive information where social and ecological systems that are crucial for sustainability are at risk
• need to design for surprise and adaptation, favouring diversity, flexibility and reversibility
• need to prefer safe fail over fail-safe technologies
• need to seek broadly comprehensible options rather than those that are dependent on specialized expertise
• need to ensure the availability and practicality of backup alternatives
• need to establish mechanisms for effective monitoring and response

Immediate and long term integration
the requirement:
Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.

considerations:
• integration is not the same as balancing
• because greater efficiency, equity, ecological integrity and civility are all necessary for sustainability, then positive gains in all areas must be achieved
• what happens in any one area affects what happens in all of the others
• it is reasonable to expect, but not safe to assume, that positive steps in different areas will be mutually reinforcing

illustrative implications:
• need positive steps in all areas, at least in general and at least in the long term
• need to resist convenient immediate compromises unless they clearly promise an eventual gain

- from Gibson et al (2005)

This is little more than a working list of the titles of general requirements. They are based on a careful synthesis of literature and case experience and are accompanied elsewhere by modest elaborations (Gibson et al, 2005, chapter 5). But there is no reason to insist on this particular formulation. The items could be subdivided, reconstructed, reordered and reworded in a host of different ways. And like any such offering this one is properly subject to continued learning and adjustment.

In any event, an acceptable listing of core sustainability requirements is just a beginning. For practical applications, there are aggregation, comparison and conflict problems to be addressed. Logically, the integration requirement demands that the first six requirements be pursued in mutually compatible ways that win positive effects all round, and that precaution and adaptation be included in every case. Perhaps this agreeable result can be achieved more often than we might expect. But existing examples are rare. In practice there will be tensions and conflicts between and among the objectives. To ensure that these are addressed carefully, in ways that do not compromise the core criteria, sustainability assessment needs trade-off rules.

Also, this listing only sets out the general requirements. As will be discussed below, the specifics of each item and the package as a whole must be defined in context, by the relevant communities of interest and concern. How this specification is done – what processes are used for the discussions and choices involved, how the means fit with the ends – is no less important than the general requirements to be respected.

Elaborating approaches to trade-off decisions

For sustainability, positive improvements are needed to meet all of the core requirements. Each is crucial and all are to be applied together. Significant and lasting improvements rely on linked, mutually supporting, positive steps on all fronts. There is no way around this. In practice, however, compromises and trade-offs will be unavoidable in most policy, programme, plan and project decisions if only because overall global conditions are now so very far from sustainability.

In conventional decision making, trade-offs between narrowly biophysical or ecological considerations and competing social and economic objectives may be made outside the assessment framework. In sustainability assessment, all the policy commitments and all the development objectives are considered together and the trade-offs are addressed directly.

Common trade-off dilemmas include how to make net gain and loss calculations and whether to accept proposals for compensations and substitutions. Are, for example, the very long term risks from initially secure deep underground disposal of toxic wastes acceptable as a trade-off for reduction of the near term ecological damage risks from surface storage of these wastes? Are the temporary negative effects of aggregate extraction justifiable on somewhat degraded agricultural lands if some of the profits are used eventually to rehabilitate these lands?

Is a constructed wetland a satisfactory replacement for a slightly smaller natural one? Should decision makers accept major damages to the interests of tribal people displaced by a new dam if that dam promises more material security for larger numbers of poor farmers downstream? Can new recreational facilities compensate a First Nations community adequately for new risks to traditional hunting or fishing? Should industrial process improvements that bring efficiency gains as well as job losses be considered a step towards or away from sustainability?

Even where sustainability objectives are widely understood and commonly accepted, different interests are likely to reach different conclusions about which of these compensations and net calculations may be justified. The answers often also depend on the details. Just how serious are the losses, risks and gains involved? Just how inequitable is the distribution of effects?

There are two interdependent approaches to dealing with trade-offs: rules and processes.

Rules: Sustainability-based environmental assessment regimes can clarify application of the sustainability requirements by setting out general rules, or least guidelines, for decisions about what sorts of trade-off may or may not be acceptable. These can be complemented by more specific region- or sector-specific clarifications. But perhaps few set rules will be appropriate for all cases (different communities, cultures, ecosystems, stresses, aspirations, capacities, etc.) even within particular regions or sectors.

The one clearly essential general rule is that trade-off decisions must not compromise the fundamental objective of net sustainability gain. It is also generally desirable that all "significant" compromises and trade-off be clearly identified, openly discussed and explicitly justified, and that the most desirable (or least bad) option be chosen. There are also possible rules that might often be appropriate, but probably not always. In particular contexts, it might be proper to rule that

- no "significant" compromises or trade-offs will be permitted, unless approved by all relevant stakeholders; or
- only undertakings that are likely to provide neutral or positive overall effects for each core sustainability requirement can be acceptable (e.g. no net additional burdens on the poorest of the poor); or
- no significant adverse effects in any core category can be justified by compensations of other kinds, or in other places (e.g. no use of ecological rehabilitation compensations for significantly greater inequities).

On these and other such matters where the specific circumstances are crucial, the general rules will need to be complemented by case and context specific elaborations.

Processes: Some of general and case/context specific rules can set a more or less substantive test (e.g. no displacement of significant negative effects to the future). But often the key need is to ensure that the difficult choices are approached in an acceptable way. This is a job for process rules. General process rules might, for example, require that the deliberations be open to scrutiny and participation by interested parties, and that rationales be provided for proposed trade-offs.

Some process rules are broadly applicable. Others will have to be adopted as appropriate for differing circumstances. The relevant decision processes may often find it helpful to use some of the many tools (systems analysis, scenario-building, cost-benefit analysis, risk assessment, multistakeholder negotiation, etc.) that have been developed for formal decision making about trade-offs. But while expertise and technical tools can be beneficial, trade-off decisions are essentially and unavoidably value-laden. What and whose values are able to play a role in the design and application of tools, and in the use of deliberative processes, are therefore crucial.

Because any conceivably acceptable set of general or region/sector rules will provide limited guidance, processes for case-specific clarifications will be needed. The key considerations here are how the issues are presented, debated and resolved and by whom.

There are no easy answers to these questions. However, some central considerations seem clear enough:

- While expertise and technical tools can be very helpful, these are essentially and unavoidably value-laden decisions.
- Open and effective involvement of all stakeholders (those representing sustainability-relevant positions as well as those potentially affected) is necessary.
- Informed clarification of rules about possibly acceptable compromises and trade-offs depends on reasonable agreement on the context-specific sustainability objectives and on reasonable awareness of the relevant conditions and influences (this favours use of scenario-building and system depiction methods).
- Because clarifications are needed to guide the planning of undertakings from the outset, anticipatory processes at the strategic level (though environmental assessment and equivalent planning and other processes) and early deliberations at the project level are desirable.
- Because understandings and possibilities evolve, processes for clarifying objectives and acceptable compromises and trade-offs must be iterative, with tentative positions revisited throughout planning, decision making and implementation.

Box 2 presents a set of generic sustainability assessment trade-off rules that are meant to be applicable in any case.

Box 2: Basic Sustainability Assessment Trade-off Rules

Maximum net gains
Any acceptable trade-off or set of trade-offs must deliver net progress towards meeting the requirements for sustainability; it must seek mutually reinforcing, cumulative and lasting contributions and must favour achievement of the most positive feasible overall result, while avoiding significant adverse effects.

Burden of argument on trade-off proponent
Trade-off compromises that involve acceptance of adverse effects in sustainability-related areas are undesirable unless proven (or reasonably established) otherwise; the burden of justification falls on the proponent of the trade-off.

Avoidance of significant adverse effects
No trade-off that involves a significant adverse effect on any sustainability requirement area (for example, any effect that might undermine the integrity of a viable socio-ecological system) can be justified unless the alternative is acceptance of an even more significant adverse effect.

• Generally, then, no compromise or trade-off is acceptable if it entails further decline or risk of decline in a major area of existing concern (for example, as set out in official international, national or other sustainability strategies or accords or as identified in open public processes at the local level), or if it endangers prospects for resolving problems properly identified as global, national and/or local priorities.

• Similarly, no trade-off is acceptable if it deepens problems in any requirement area (integrity, equity, etc.) where further decline in the existing situation may imperil the long term viability of the whole, even if compensations of other kinds, or in other places are offered (for example, if inequities are already deep, there may be no ecological rehabilitation or efficiency compensation for introduction of significantly greater inequities).

• No enhancement can be permitted as an acceptable trade-off against incomplete mitigation of significant adverse effects if stronger mitigation efforts are feasible.

Protection of the future
No displacement of a significant adverse effect from the present to the future can be justified unless the alternative is displacement of an even more significant negative effect from the present to the future.

Explicit justification
All trade-offs must be accompanied by an explicit justification based on openly identified, context specific priorities as well as the sustainability decision criteria and the general trade-off rules.

• Justifications will be assisted by the presence of clarifying guides (sustainability policies, priority statements, plans based on analyses of existing stresses and desirable futures, guides to the evaluation of "significance", etc.) that have been developed in processes as open and participative as those expected for sustainability assessments.

Open process
Proposed compromises and trade-offs must be addressed and justified through processes that include open and effective involvement of all stakeholders.

• Relevant stakeholders include those representing sustainability-relevant positions (for example, community elders speaking for future generations) as well as those directly affected.

• While application of specialized expertise and technical tools can be very helpful, the decisions to be made are essentially and unavoidably value-laden and a public role is crucial.

- from Gibson et al (2005)

Like the generic sustainability-based decision criteria, these generic trade-off rules would need to be supplemented by particular guidance adopted for and respectful of the particular contexts of specific cases.

Incorporating case and context specifics

The generic criteria and trade-off rules above provide a basic framework that covers the key sustainability issues and their interconnections. Use of these as the basic framework should ensure that no big common issues are neglected. The next step is to add in the key considerations that are specific to the case and its particular context. Things get more difficult here.

There are two interrelated areas of practical difficulty – how to identify the case and context specific considerations that should be integrated with the generic requirements into the overall set of sustainability assessment criteria, and how to structure the integrated result.

The first problem is often approached, at least initially, as desk research. Sustainability assessments can draw from a variety of documentary sources to identify major case- and context-specific considerations. These include

- existing policy and planning documents that set out key concerns and priorities at the local, regional, territorial and/or national level,
- considerations that emerged in prior assessments or similar processes dealing with the same context,
- earlier deliberations on the case, especially involving the key stakeholders, and
- other sources of local and/or larger scale information that sheds light on how the various generic sustainability concerns are reflected in the circumstances and issues of the particular case and context.

Additional considerations can often be identified or anticipated by informed observers and specialized experts. This is rarely if ever sufficient, however.

What matters in any case and context inevitably depends more or less heavily on what matters to the people concerned and this means participative engagement of these people is needed. There are several key considerations here. Perhaps the most obvious is that on many context-specific topics, those in the context are likely to have crucial insights. Their views, hopes, fears, flexibilities and commitments are also themselves important contextual factors that will influence what changes are feasible and which ones may be judged positive.

Moreover, the context of understandings and preferences is dynamic. It will move in the course of deliberations, and it is more likely to move towards broader understandings and suitably amended preferences where there are participative deliberations about proposed undertakings and their implications, especially where these deliberations include the comparison of serious competing options, and where the broad generic suite of sustainability requirements helps to frame the discussions. Finally, the importance of

issues is typically as much a matter of public preference and choice as it is a possible determination from technical analysis.

There is a wonderful array of potentially suitable methods and tools for inspiring, informing, and guiding public and multi-stakeholder discussions on case issues and priorities. They include, for example, backcasting scenario building exercises that help reveal case/context priorities and facilitate depiction of overall objectives and implications (e.g. Ravetz, 2000; Robinson, 2003) community mapping (Lydon, 2000; Porter et al, 2002; CMN, 2005) and cumulative effects projections (Cizek et al, 2002; Cizek and Montgomery, 2005).

Most of the leading tools can link attention to generic and specific considerations, at various scales. Beyond the elaboration of case- and context-specific decision criteria, many approaches can also go beyond the relatively easy identification of individual concerns and objectives to the much harder job of depicting systemic interrelations and overall implications. But few if any are suitable for all applications and there is plenty of room here for more practical testing, and for guidance on what to use and how in particular circumstances.

The second problem – how to structure the resulting integrated set of generic and case/context specific criteria into one workable package – also defies easy solution. There are three basic options:

- integration of case/context specific considerations and concerns under the core assessment criteria categories (e.g. the ones set out above),
- integration of the assessment criteria under case/context issue categories, and
- hybrid models.

Each has important strengths and weaknesses. Using the generic criteria to provide the basic structure promises strong early guidance and consistency of practice, but is vulnerable to awkward fit with local concerns and poor reception as an imposed agenda. Using case/context issues as the framework offers better fit with and acceptance in the context, but could rarely be in place early enough to guide the crucial first steps in defining the immediate purposes and alternatives to be considered. Hybrid combinations might often work best, but they too would limit consistency, and could lead to long unwieldy lists of criteria. Here too, no single solution is likely to be satisfactory and there is yet much to learn from experimentation.

Sustainability assessment process design

Designing sustainability assessment regimes, and building *ad hoc* sustainability assessment approaches for individual cases, is mostly a matter of integrating the insights and components above with the lessons from advanced planning and assessment initiatives and from sustainability assessment efforts so far.

Conventional assessment and planning processes today are not often well designed for addressing human and ecological effects within complex systems. Few emphasize

attention to maximizing positive long term improvements. Most fail to ensure effective integration of sustainability considerations in the key early decisions on purposes and preferred options. Too often the results are merely advisory, have little influence in final decisions, or are incorporated with compromises and trade-offs that are reached through separate, non-transparent negotiations wherein environmental matters are still treated as constraints, in conflict with priority objectives.

At the same time, the basic design features for sustainability assessment processes are not greatly different from those for best practice environmental assessment and planning regimes.[7] They apply explicit evaluation criteria in the preparation, evaluation, approval and implementation of policies, programmes and projects, are characteristically anticipatory and forward looking, and can integrate a wide variety of concerns and considerations. Most are flexible enough for application to very different cases in very different circumstances, can be used to force attention to otherwise neglected considerations, are open to public involvement, and have been demonstrably adaptable in ways that suggest capacity for progressive evolution. Indeed, assessment and planning process changes over the part thirty years or so have generally moved both concept and practice in the direction of sustainability assessment (Gibson et al, 2005, chapter 2).

Sustainability assessment as the core approach to decision making is clearly more ambitious than conventional assessment and planning efforts. It is committed to positive overall contributions to a more desirable and durable future through the identification of best options (not just acceptable undertakings), and it is designed to achieve multiple reinforcing gains (rather than mere avoidance of problems and mitigation of adverse effects).

While sustainability assessment demands more coherent and comprehensive decision making, it must also respect context and uncertainty. Considerable flexibility for different applications is required because there are recognized obligations to understand and respect contextual differences, to work iteratively with the relevant communities, and to adapt to new understandings, different ecosystems and communities, and emerging challenges and opportunities. However, commitment to a common set of fundamental requirements, and to their integrated application, provides a strong basis for overall consistency from policy, programme and plan design to post-approval project implementation monitoring.

The particular combination of flexibility and consistency permits decentralization of decision making as well as more deliberate integration of objectives and priorities, and more consistent substance in and processes for overall planning and evaluation. Needs for specialists in particular areas (ecological effects, gender equity analysis, etc.) continue. Such specialists, however, need also to look beyond their particular mandate and expertise to recognize broader implications, especially where trade offs or openings for positive reinforcements may be involved.

Even more than conventional environmental assessment, sustainability assessment is unavoidably permeated by needs for value-laden choices in the face of uncertainty; openness and effective involvement of the interested public is therefore crucial. Transparency and accountability are assisted by requirements for explicit criteria and

procedures for evaluations and decisions, including those dealing with conflicts and trade-offs. But these alone are not enough. Effective public engagement is necessary throughout the deliberations from initial consideration of purposes and options to monitoring and decommissioning or renewal.

With these considerations in mind, it is not difficult to adjust the basic characteristics of advanced assessment and planning regimes to form the essentials of generally applicable sustainability assessment process design. These are set out in Box 3.

Box 3: The core features of sustainability assessment regime design

- establishes assessment as an approach to decision making (in the conceptualization, planning, design, evaluation, approval, implementation and monitoring and eventual decommissioning of undertakings), not just a review at a particular stage or one contribution among others and establishes "positive contribution to sustainability" as the basic criterion for evaluations and decisions
- covers all potentially significant initiatives, at the strategic as well as project level, in a way that connects work at the two levels, and focuses attention on the most significant undertakings and on openings for the greatest beneficial influence
- ensures that proponents of undertakings and responsible authorities are aware of their assessment obligations before they begin planning and that they have effective motivations (legal requirements or the equivalent) to meet these obligations
- is transparent and ensures open and effective involvement of local residents, potentially affected communities and other parties with important knowledge and concerns to consider and an interest in ensuring properly rigorous assessment, and facilitates special steps to ensure representation of important interests and considerations not otherwise effectively included (e.g. disadvantaged populations, future generations, broader socio-ecological relations)
- adopts a scope that covers the full set of global and regional as well as local sustainability concerns through application of generic criteria, but combines this with sensitivity to the particular context (ecological, cultural, socio-economic, etc.) through direct engagement of stakeholders in identifying key case-specific concerns and priorities to supplement and/or elaborate the generic criteria
- requires integrated consideration of all factors that may affect prospects for meeting these requirements
- focuses on achieving multiple, mutually reinforcing gains, as well as avoiding significant (especially, permanent) losses, in all the interrelated areas of sustainability concern, in addition to serving the immediate purposes of the undertaking
- aims to identify the best option (that offers the greatest overall benefits and that avoids undesirable trade-offs) through comparative consideration of possibly reasonable alternatives, (rather than merely to enhance/mitigate the effects of an already chosen option)

- is initiated at the outset of policy, plan, programme and project deliberations when problems and/or opportunities are identified and selection of case-specific purposes can be informed by the "contribution to sustainability" objective
- requires critical examination of purposes and alternatives
- addresses indirect and cumulative as well as direct and immediate effects
- favours options incorporating adaptive design and requires preparation for adaptive implementation of approved undertakings
- specifies and applies explicit rules and requires explicit rationales for trade-off decisions
- includes effective means of monitoring implementation and effects, and of ensuring appropriate response to identified problems and opportunities
- recognizes uncertainties, favours caution, designs for continuous learning and follows initial decisions for adaptive adjustment through the full lifecycle of assessed undertakings
- contributes to sustainability through the assessment process itself as well as through the better decisions that result, in part by incorporating open participative approaches, respecting different interests, and integrating different kinds of knowledge
- is established in law in ways that ensure openness to effective public scrutiny and participation as well as public initiation of legal action to compel compliance with assessment obligations

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Sustainability assessment implementation

Sustainability assessment has so far been explored mostly through particular initiatives undertaken in more or less special circumstances. Proliferation of such initiatives seems likely to continue, if only because there are so many real problems that demand attention to intertwined socio-economic/political and biophysical/ecological considerations and require a long term perspective. Often this will involve creation of more *ad hoc* processes. Sometimes it will be possible to make creative use of existing legislated regimes such as in the Voisey's Bay environmental assessment (Gibson, 2000), or to legislate new mechanisms with sustainability assessment capacities, such as the British regional planning process (UK ODPM, 2005). But eventually it will be necessary to establish sustainability assessment regimes that apply broadly to a wide range of undertakings.

No existing jurisdiction has yet incorporated all of the Box 3 features into the design and application of a dedicated sustainability assessment regime. And probably no jurisdiction will find it easy. Sustainability is, after all, an essentially critical concept. It arose because of the evident and fundamental deficiencies of conventional decision making and it requires significant change in how we think about our choices and how we structure our institutions as well as our processes of evaluation and decision.

Moreover, the agenda of sustainability assessment is demanding at a time when, in many jurisdictions, it will not be acceptable for sustainability assessment to add to the overall

burdens of deliberation. And implementation in most places will be hampered by poor fit with the relevant authorities' existing mandates, obligations and expectations (their established accountability and effectiveness monitoring systems, current legislated environmental assessment processes, etc.).

Sustainability assessment does offer important advantages, even from a purely administrative perspective. One especially attractive quality is that it can offer efficiency gains by providing a means of consolidating the variety of ill-connected, overlapping and competing processes that have proliferated in most jurisdictions in recent decades. Perhaps more importantly, its consistent framework and full cycle application can help to ensure that important lessons are learned only once the hard way and that more initiatives deliver multiple gains.

Implementation will also be facilitated by complementary progress in the broader realm of sustainability initiatives. Development of sustainability objectives and indicators, including locally and regionally specified ones, has been supported by many organizations and jurisdictions for more than a decade. Tools for integrating multiple lay stakeholders in evaluation and decision processes (through scenario-building, design charettes, valued ecosystem component identification, site selection criteria development, community mapping, etc.) are becoming increasingly well tested and sophisticated.

Advanced methodologies for depicting complex systems and considering future changes in them are being applied at scales from the local to the global. As the already broad range of sustainability-oriented deliberations (urban planning, collaborative resource management, corporate greening, alternative national accounts, industrial ecology, growth management, etc.) continues to expand, it is reasonable to anticipate many further contributions of insight and methodology.

In addition, sustainability assessments can act as means of solving their own problems. Because they force more rigorous and better integrated attention to sustainability requirements as the key concern of decision making in particular circumstances, they serve as a mechanism for clarifying general sustainability requirements, indicators and trade off rules, and for specifying them in particular contexts, through informed choices by the relevant parties.

Nevertheless, few jurisdictions are likely to be bold enough to introduce a best practice sustainability assessment regime in a single comprehensive step. Most will rely on incremental steps, perhaps through progressive adjustment of existing planning and/or assessment processes. This can work well. However, it is not entirely risk free.

One of the great challenges of environmental assessment and planning processes has been to force attention to factors that had been generally neglected in conventional decision making. Effects on ecosystems and communities are now much more likely to be noted and taken seriously than they were in the years before open environmental assessment and participative planning. But the gains so far have been limited and remain fragile in many jurisdictions.

Carefully considered steps to introduce broader sustainability assessment should root

ecosystem and community considerations more deeply in the core of deliberations and decisions. But badly designed incremental moves towards sustainability assessment could provide means of reasserting the old dominance of narrow economic and technical considerations, reduce direct attention to ecology and community, and erase some of the hard won gains of the past three decades.

Three complementary solutions are available. The first is to continue efforts to clarify sustainability assessment aims and requirements. The better we understand the objective, the less likely we are to go astray in implementation efforts. The second is to accept the precautionary reliance on diversity. As noted above, experiments with sustainability assessment or its equivalent have been and are being undertaken not just in environmental assessment regimes but also in land use planning, site restoration, corporate greening, community level development assistance, trade option evaluation and a host of other fields.

Moreover, they are using not just conventional law and policy tools but also certification schemes, corporate behaviour codes, ethical investment criteria, sustainable livelihood analyses, multi-stakeholder collaborations and a long list of other mechanisms. Errors and missteps in any one of these areas will be minimally dangerous so long as the same basic agenda is being pursued on many other fronts.

Finally, all implementation efforts, however incremental, need to be centred on establishment of the most fundamental components. These are the four identified near the beginning of this paper, plus one needed to keep the whole exercise honest.

The most crucial and first priority steps to implement sustainability assessment processes are those that

- establish contribution to sustainability as the main test of proposed purposes, options, designs and practices, and must put application of this test at the centre of decision making, not as one advisory contribution among many.
- adopt evaluation and decision criteria and trade-off rules that reflect the full set of core requirements for progress towards sustainability, recognize interdependencies and seek multiple reinforcing gains on all fronts;
- provide means of specifying the sustainability decision criteria and trade-off rules for specific contexts, through informed choices by the relevant parties (stakeholders);
- apply these insights in the full set of process elements, including identifying appropriate purposes and options for new or continuing undertakings; assessing purposes, options, impacts, mitigation and enhancement possibilities; choosing (or advising decision makers on) what should or should not be approved and done, and under what conditions; and monitoring, learning from the results and making suitable adjustments through implementation to decommissioning or renewal; and
- ensure that the deliberations and decisions are sufficiently open to scrutiny and participation, and sufficiently accountable in law, that an informed public can push effectively for proper application.

The elaboration and implementation of sustainability assessment processes so far has involved a good deal of experimentation and learning on the job. The resulting

accumulation of insights and tested applications is now substantial, and it provides a good working foundation for the approach sketched out here. But we have only begun along the path to sustainability-based decision making. Like any other set of proposals, the decision criteria, trade-off rules, context incorporation steps and regime design features set out above are meant for critical testing and continued adjustment as we gradually develop a better understanding of desirable and durable ways of living on this planet.

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[1] Much of the discussion is based on and summarizes the much more detailed treatment in Gibson et al (2005).

[2] These include, for example,

- expanded awareness of the interconnections among social, ecological and economic factors, especially in areas of pressing public concern and controversy such as health, security, livelihood maintenance and opportunities, and future quality of life;
- advances in the study of ecology and resource management, but now also in other socio-political and biophysical realms, where there has been increasing attention to the realities and implications of complex systems with multiple interacting factors and dynamic self-organizing processes in multiple interacting scales, with pervasive and inevitable uncertainties (e.g., Gunderson et al, 1995; Gunderson and Holling, 2002),
- the rise of studies and applications in the field of "new governance" recognizing the limitations as well as power of market mechanisms, doubts about the potential adequacy of state interventions, acceptance of expanded "governance" roles for other tools and players, awareness of context dependency, and skepticism about "civilizing missions" and universal solutions (e.g., Beck, 1999; Sachs, 1999; Dryzek, 2000; Paehlke, 2003);
- continuing economic globalization combined with concerns about its implications for distributive justice, cultural identity, and ecological stewardship;
- pressures on public authorities and private enterprises to enhance efficiencies, including by getting multiple benefits from individual initiatives; and
- spreading acceptance of the precautionary principle in response to deepening concerns about global scale health and ecological risks, and declining faith in the potential adequacy of scientific knowledge and technical repair (e.g. Harrernoës et al, 2001).

[3] For a discussion of the pillars approaches, see Mebratu (1998). The Canadian International Development Agency has taken a five pillar approach. See CIDA (1997), chapter 2, "The Sustainable Development Framework".

[4] The United Kingdom, which favours "quality of life" as an integrating title, identifies for its national sustainability strategy the following ten cross-cutting "principles":

- putting people at the centre;
- taking a long term perspective;
- taking account of costs and benefits;
- creating an open and supportive economic system;
- combating poverty and social exclusion;
- the precautionary principle;
- using scientific knowledge;
- transparency, information, participation and access to justice;
- making the polluter pay

(UK, 1999)

[5] For example, the nine "Hannover principles of design for sustainability" (McDonough and Braungart, 1992) give no attention to equity considerations:
• Insist on rights of humanity and nature to co-exist.
• Recognize interdependence.
• Respect relationships between spirit and matter.
• Accept responsibility for the consequences of design decisions.
• Create safe objects of long-term value.
• Eliminate the concept of waste.
• Rely on natural energy flows.
• Understand the limitations of design.
• Seek constant improvement by the sharing of knowledge.

[6] While the consolidations do not use the same categories, they reflect broad agreement on the key considerations. The sets of sustainability criteria prepared for environmental assessment applications by Clive George (1999) centre on present and future equity, combining ecological and socio-economic considerations. Keith Pezzoli, who carried out a transdisciplinary review of sustainable development literature in the mid 1990s, identified the four key challenges as holism and co-evolution, social justice and equity, empowerment and community building, and sustainable production and reproduction (Pezzoli, 1997). Neil Harrison (2000) found three key concentrations in the literature – efficiency, equity and ethics – judged each of them too limited and mechanical, and proposed to incorporate them all within an emphasis on building social capacity for flexibly adaptive action. Other authors have proposed other organizational frameworks. But the categorizations are not as important as the essential substance, and on this George, Pezzoli, Harrison and other consolidators generally agree.

[7] The key design features for environmental assessment processes are well documented. See for example, Gibson (1993), CSA (1999), Senécal et al (1999) and IAIA (2002).