Sustainability assessment: basic components of a practical approach

Robert B. Gibson
Environment and Resource Studies
University of Waterloo, Waterloo, Ontario, Canada N2L 3G1
phone 519 888 4567 x3407; fax 519 746 0292
rbgibson@uwaterloo.ca

Abstract: The last few years have brought a variety of experiments with forms of sustainability assessment. Some initiatives, such as the Voisey's Bay nickel mine-mill environmental assessment in Newfoundland and Labrador, Canada, have centred on adoption of sustainability-based criteria in an otherwise conventional project-level environmental assessment. In others, such as the urban growth management initiatives in southwestern British Columbia, the applications have been at the strategic level and connected to policy and planning regimes.

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 are addressed in this paper. They are

- to identify the basic insights about sustainability requirements that inform a transition to sustainability assessment
- to sketch out the basic implications for sustainability assessment processes, and
- to provide an initial elaboration of approaches the most challenging areas, including how to define core sustainability requirements as evaluation and decision making criteria, and how to deal with the inevitable compromises and trade-offs among these requirements.

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

Sustainability assessment: basic components of a practical approach

The emergence of sustainability assessment

Section 4 of the *Canadian Environmental Assessment Act* sets out the core purposes of the legislation. One of these purposes is to

> Encourage responsible authorities to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy (CEAA, s.4(1)(b))

Such statements of commitment to sustainability are increasingly common in environmental law and policy. Indeed, they are increasingly common in areas of law and policy not usually categorized as environmental. Much of this has been dismissed as verbiage intended as a superficial green wrapping. But more frequently in recent years we have seen serious attempts to define sustainability objectives, to identify appropriate indicators, to apply sustainability criteria in important decision making.

Consider two cases at the further reaches of Canada – the environmental assessment of the Voisey's Bay nickel mine project on the north coast of Labrador, and the regional growth management strategies for expanding urban areas here in southwestern British Columbia, including the Greater Vancouver Regional District, and the Capital Regional District over on Vancouver Island.

On the surface they are very different. But both represent exercises in applied sustainability assessment.

The Voisey's Bay nickel mine/mill assessment

In the Voisey's Bay case, the review panel observed that "Promotion of sustainable development is a fundamental purpose of environmental impact assessment." Accordingly, the panel established "contribution to sustainability" as the key evaluative test. In its *Environmental Impact Statement Guidelines for the Review of the Voisey's Bay Mine and Mill Undertaking*, the panel stated,

> It is the Panel's interpretation that progress towards sustainable development will require the following:
> • the preservation of ecosystem integrity, including the capability of natural systems to maintain their structure and functions and to support biological diversity;
> • respect for the right of future generations to the sustainable use of renewable resources; and,

> • the attainment of durable and equitable social and economic benefits.
>
> Therefore, in reviewing the EIS and other submissions, the Panel will consider:
> • the extent to which the Undertaking may make a positive overall contribution towards the attainment of ecological and community sustainability, both at the local and regional levels;
> • how the planning and design of the Undertaking have addressed the three objectives of sustainable development stated above;
> • how monitoring, management and reporting systems will attempt to ensure continuous progress towards sustainability; and,
> • appropriate indicators to determine whether this progress is being maintained. [1]

We can certainly debate how well the proponent in this case responded to the challenge. But certainly a higher test was imposed. It was not sufficient in this case merely to mitigate the significant adverse environmental effects. The proponent had to show how it would make "a positive overall contribution towards the attainment of ecological and community sustainability."

Regional growth strategies in British Columbia

Here in British Columbia, a rough equivalent has been attempted in planning for growth management in expanding urban regions, such as Vancouver. In this case the relevant legislation is the *Growth Strategies Amendment Act*, now incorporated into the province's *Municipal Act* (RSBC 1996, chap 323). The law doesn't actually require urban regions with rising populations to develop formal growth strategies, but it nudges them strongly and facilitates the work. The idea is to ensure that the various municipal governments in these regions do some regional scale planning, that they negotiate shared goals and approaches and make a serious collective effort to guide their growth to desired ends. The underlying assumption is the unguided growth is likely to be problematic in many ways – damaging to neighbourhoods and green spaces, costly to service, unsightly, wasteful of resources, and so on. The purpose of the growth strategies legislation is therefore similarly comprehensive:

> The purpose of a regional growth strategy is to promote human settlement that is socially, economically and environmentally healthy and that makes efficient use of public facilities and services, land and other resources (s.849(1)).

The law goes on to provide a long but open-ended list of matters to be addressed in regional growth strategies:

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[1] Voisey's Bay Mine and Mill Environmental Assessment Panel, *Environmental Impact Statement Guidelines for the Review of the Voisey's Bay Mine and Mill Undertaking,* 20 June 1997, section 3.3. For a discussion of the broader significance of these guidelines, see Robert B. Gibson, "Favouring the higher test: contribution to sustainability as the central criterion for reviews and decisions under the *Canadian Environmental Assessment Act*," *Journal of Environmental Law and Practice* 10:1 (2000), pp. 39-55.

(a) avoiding urban sprawl and ensuring that development takes place where adequate facilities exist or can be provided in a timely, economic and efficient manner;
(b) settlement patterns that minimize the use of automobiles and encourage walking, bicycling and the efficient use of public transit;
(c) the efficient movement of goods and people while making effective use transportation and utility corridors;
(d) protecting environmentally sensitive areas;
(e) maintaining the integrity of a secure and productive resource base, including the agricultural and forest land reserves;
(f) economic development that supports the unique character of communities;
(g) reducing and preventing air, land and water pollution;
(h) adequate, affordable and appropriate housing;
(i) adequate inventories of suitable land and resources for future settlement;
(j) protecting the quality and quantity of ground water and surface water;
(k) settlement patterns that minimize the risks associated with natural hazards;
(l) preserving, creating and linking urban and rural open space including parks and recreation areas;
(m) planning for energy supply and promoting efficient use, conservation and alternative forms of energy;
(n) good stewardship of land, sites and structures with cultural heritage value (S.849(2)).

Together these package components are clearly meant to cover all the major components that need attention in efforts to ensure "a positive overall contribution towards the attainment of ecological and community sustainability." The usual approach to strategy development involves collaborative and consultative work to clarify the objectives, depict alternative future scenarios, consider the implications, choose among competing options, and specify the planning responses. And where the regional growth strategy work is done well – here in the Greater Vancouver Regional District and across the Strait of Georgia in the Capital Regional District, for example[2] – the process is in essence a broad version of strategic assessment, and the results represent serious efforts to identify and move towards a future that is ecologically, socially and economically more viable and desirable. As in the Voisey's Bay case we can debate just how much progress has been made in particular strategy initiatives and how much progress along the path towards sustainability is likely to be achieved. But clearly here, as in the Voisey's Bay assessment, the goal is no longer just to mitigate specific kinds of damage. A more ambitious, more comprehensive and better integrated set of objectives is involved.

Beyond the individual cases

[2] The Greater Vancouver Regional District cases is examined in Ray Tomalty, "Growth management in the Vancouver Region, *Local Environment* 7:4 (November 2002), pp.431-445. The Capital Regional District's efforts are examined in Michelle Boyle, Robert B. Gibson and Deborah Curran, "If not here, then perhaps not anywhere: urban growth management as a tool for sustainability planning in British Columbia's Capital Regional District," *Local Environment* 9:1 (February 2004), pp.21-43.

The Voisey's Bay mine and BC growth management strategy cases are just two among many emerging experiments with what amounts to sustainability-centred assessment. We could discuss examples from a host of different fields – from site level green building design exercises and the application of sustainable livelihood approaches in community-level development assistance to global industrial sector reform (e.g. in metal mining[3]) and sustainability-based evaluation of international trade liberalization options.

For a variety of reasons we can also anticipate a continuing spread of such efforts:
- because citizens and authorities are increasingly aware of the interconnections among economic, social and ecological considerations,
- because the costs and perils of unsustainable behaviour are becoming more evident at every level,
- because authorities who have now spent well over a decade making formal commitments to sustainability are being pressed to act accordingly, and
- because, after lengthy contests over the meaning of "sustainability" and "sustainable development", there is some emerging consensus on the fundamentals.

If this is so, perhaps it is time to take the next step beyond the individual experiments with sustainability-centred assessments of various kinds, and to consider what can commonly applied.

That, in any event is the agenda of this paper. The sections that follow
- identify the basic insights about sustainability requirements that inform a transition to sustainability assessment,
- sketch out the basics of sustainability assessment processes, and
- provide an initial exploration of two particularly challenging areas: how to construct a working understanding of the core sustainability requirements to be used as evaluation and decision making criteria, and how to deal with the inevitable compromises and trade-offs between and among these requirements in particular cases.

Sustainability concept basics

Sustainability is a very old idea. Except for the last few hundred years, most societies other than those engaged in empire building were essentially customary; they were chiefly concerned with maintaining and continuing well tested ways of doing things. Recent attention to sustainability is of a different sort. It presumes a world of change and seeks progress, though of a different sort

[3] A particularly illuminating current example is discussed in Mining, Minerals and Sustainable Development Project, *Breaking New Ground: Mining, Minerals, and Sustainable Development* (London: International Institute for Environment and Development and World Business Council for Sustainable Development, May 2002), available in PDF files online at www.iied.org/mmsd/finalreport.

from what now prevails. Essentially, the present concept of sustainability stands as a critique, 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.

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 a decade and a half of experimentation as well as study, there has been evident progress towards consensus on the fundamentals, supported by complementary developments in several adjacent areas of theory and practice.[4]

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

- sustainability considerations include socio-economic as well as biophysical matters and are especially concerned with the interrelations between and interdependency of the two;
- human as well as ecological effects must be addressed as parts of large complex systems;
- because the complexity of these systems makes full description impossible, prediction of changes uncertain, and surprise likely, precaution is needed;
- 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; and
- 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, public preferences, etc.

Sustainability assessment process basics

Sustainability requirements can and should be applied in many different ways, but assessment processes that apply explicit evaluation criteria in the preparation, evaluation, approval and implementation of policies, programs and projects are particularly well suited as vehicles for the pursuit of sustainability. Advanced environmental assessment processes today are

[4] These include, for example, advances in the study of complex systems, especially in ecology and resource management, but now also in other socio-political and biophysical realms, there has been increasing attention to the realities and implications of complex systems (cf L. Gunderson et al, *Barriers and Bridges,* C.S. Holling, *Panarchy*), and the field of "new governance" recognizing the power and limitations 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 (cf John Dryzek, *Deliberative Democracy and Beyond,* Robert Paehlke, *Democracy's Dilemma,* Wolfgang Sachs, *Planet Dialectics,* Ulrich Beck, *Ecological Politics in an Age of Risk*).

characteristically anticipatory and forward looking, integrative, flexible enough for application to very different cases in very different circumstances, generally intended to force attention to otherwise neglected considerations, open to public involvement, and adaptable in ways that suggest capacity for progressive evolution. Indeed, environmental assessment process changes over the part thirty years or so have generally moved both concept and practice in the direction of sustainability assessment.[5]

At the same time, few environmental assessment processes today are well designed for addressing human and as ecological effects within complex systems. Few emphasize attention to maximizing positive long term improvements. Most environmental assessment processes fail to ensure effective integration of environmental 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.

To serve the requirements of sustainability, assessment processes will have to be adjusted substantially. The basic process considerations are as follows:

- Sustainability assessment is comprehensive assessment. The intent is to cover all core issues. Therefore, unlike typical environmental assessment (usually one of several more or less separate evaluation exercises contributing to a broader decision making process), sustainability assessment becomes the core framework for deliberations and decisions.
- Because sustainability assessment aims for positive overall contributions to a more desirable and durable future, processes must ensure attention to enhancement of positive effects as well as avoidance and mitigation of negative effects, and identify best options (alternatives) rather than just acceptable undertakings.
- Applied at the strategic as well as project level, it provides both the structure and process for policy development and the chief means by which sustainability-based policy is applied in consequent decision making at the program and project levels.
- Sustainability assessment also encourages and facilitates more effectively integrated consideration of interrelated policies, plans and projects, since the focus is on overall long term 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 different ecosystems and communities, new understandings, 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 and program design to post-approval project implementation monitoring.

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[5] See, for example, Robert B. Gibson, "From Wreck Cove to Voisey's Bay: The evolution of federal environmental assessment in Canada," *Impact Assessment and Project Appraisal* 20:3 (2002), pp.151-159.

- 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 will, however, also need to look beyond their particular mandate and expertise to recognize broader implications, where trade offs (or positive reinforcements) may be involved.
- 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.
- Explicit criteria and procedures for dealing with conflicts and trade-offs are key requirements in sustainability assessment.
- While the agenda of sustainability assessment is demanding, in many circumstances it will not be acceptable for sustainability assessment to add to the overall burdens of deliberation. The most obvious openings for administrative efficiency lie in the consolidation of now multiple, ill-connected and sometimes competing processes. But the most important gains may be in using the consistent framework and full cycle application to ensure that important lessons are learned only once the hard way.
- Implementation of sustainability assessment processes in many jurisdictions and authorities will be hampered by poor fit with some existing obligations and expectations (established accountability and effectiveness monitoring systems, current legislated environmental assessment processes, etc.). In theory, a more comprehensive and better integrated approach to the meeting existing commitments should not entail substantial conflicts with existing systems. But the reality is different. One key may lie in seeing existing evaluation and reporting requirements as a minimum base to be incorporated in the more comprehensive and coherent whole.

Implications for assessment process design

Sustainability assessment processes can be built on the general model of progressive environmental assessment regimes (integrating strategic as well as project level processes). Basically, only three major changes from environmental assessment are involved. The first is that sustainability assessment forces attention to sustainability requirements and acts as a means of identifying and judging trade-offs in light of a commitment to making positive contributions to achieving sustainability objectives. Second, sustainability assessment acts as a means of specifying these requirements and trade-off judgements – and associated values, objectives and criteria – in specific contexts, through informed choices by the relevant parties (stakeholders). Finally, sustainability assessment applies these insights in the full set of process elements recognized in progressive environmental assessment processes:

- 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.

The basic design features for sustainability assessment processes are not significantly different from those for strong environmental assessment regimes.[6] Adjusted for the sustainability mandate, the main assessment process qualities are those set out in the box below.

The basic design features of best practice sustainability assessment processes

A best practice sustainability assessment process

- begins with explicit commitment to sustainability objectives and to application of sustainability-based criteria
- covers all potentially significant initiatives, at the strategic as well as project level, in a way that connects work at the two levels
- focuses attention on the most significant undertakings (at the strategic and project levels) and on work that will have the greatest beneficial influence
- 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
- takes special steps to ensure representation of important interests and considerations not otherwise effectively included (e.g. disadvantaged populations, future generations, broader socio-ecological relations)
- gives integrated attention to social, economic, cultural, political and environmental factors, with guidance from a set of essential sustainability requirements that respect the interrelations among these factors
- incorporates means of specifying and integrating sustainability considerations particular to the local and broader context of individual assessments
- addresses indirect and cumulative as well as direct and immediate effects
- emphasizes enhancement of positive effects as well as avoidance or mitigation of negative ones
- is initiated at the outset of policy, program and project deliberations when problems and/or opportunities are identified
- requires critical examination of purposes and alternatives
- examines positive as well as negative effects and enhancements as well as mitigations

[6] The key design features for environmental assessment processes are well documented. See for example, Pierre Senécal, Barry Sadler, et al, "Principles of Environmental Impact Assessment Best Practice," (International Association for Impact Assessment and Institute of Environmental Assessment, January 1999); IAIA, "Strategic Environmental Assessment Performance Criteria," (IAIA special publication seriers No.1 (January 2002); Canadian Standards Association, Working Group of the EIA Technical committee. *Preliminary Draft Standard: Environmental Assessment*, Draft #14 (Toronto: CDA, 26 July 1999); Robert B. Gibson, "Environmental assessment design: lessons from the Canadian experience," *The Environmental Professional* 15(1), 1993, pp.12-24.

- favours options incorporating adaptive design and requires preparation for adaptive implementation of approved undertakings
- seeks to identify alternatives that offer the greatest overall benefits and that avoid undesirable trade-offs (rather than merely enhance/mitigate the effects of already chosen options)
- specifies and applies explicit rules and/or 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
- 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

No existing jurisdiction has incorporated all of these features in the design and implementation of processes with a more limited environmental assessment objective. Sustainability assessment, a newer idea that has so far enjoyed only limited and largely experimental application,[7] also lacks ideal examples. There are, however, plenty of reasons to expect more attention to advanced development and regular implementation of sustainability assessment processes.

General implementation challenges and tasks

A transition to sustainability assessment will require attention to needs in four main areas:

- *general process design:* translation of the basic design feature qualities listed above into explicit and effectively imposed obligations for careful, open attention to sustainability requirements in the conception, planning, approval, implementation and adjustment of all important undertakings at the strategic and project levels, in all jurisdictions;
- *basic decision criteria:* translation of the core requirements for sustainability into strong generic guidance on the relevant sustainability objectives, priorities and criteria, and trade off rules, for all the main kinds of undertakings and locations, and covering all the main steps of environmental assessment (including strategic assessments to guide project level work);
- *case-specific process guidance:* appropriate processes for elaboration of the general process rules and the basic decision criteria for specific places and undertakings; and

[7] See, for example, "Sustainability and EIA/SEA," *EIA Newsletter* 18 (Manchester, EIA Centre, 2002); Joe Ravetz, "Integrated assessment for sustainability appraisal in cities and regions," *Environmental Impact Assessment Review*, 20 (2000), pp.31-64; Rosa Arce and Natalia Gullón, "The application of strategic environmental assessment to sustainability assessment of infrastructure development," *Environmental Impact Assessment Review*, 20 (2000), pp.393-402; and Colin Kirkpatrick, Norman Lee and Oliver Morrissey, *WTO New Round: Sustainability Impact Assessment Study* Phase One Report (Manchester, Institute for Development Policy and Management, October 1999).

- *methods:* well tested methodologies for sustainability deliberations, plus baseline data, indicators, systems depictions, desired future scenarios and approaches to conflict resolution, for example concerning trade-offs.

Some of the necessary work is already underway in the broader realm of sustainability initiatives. Development of sustainability objectives and indicators, including locally and regionally specifies 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.

Sustainability assessments can also be expected to 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.

But none of this removes the need for an initial elaboration of basic guidance for sustainability assessment process design and application. Two key areas deserve particular attention. These are

- how to construct a working understanding of the core sustainability requirements that are to be used as evaluation and decision making criteria, and
- how to deal with the inevitable compromises and trade-offs between and among these requirements in particular cases.

Elaborating the core sustainability requirements

As was noted above in the discussion of sustainability basics, sustainability clearly involves the intertwined influences of the full range of factors that may affect long as well as short term prospects for desirable futures. In practice, sustainability assessment deals with particular strategic and project level undertakings, guiding evaluations and choices concerning their purposes, options, design, implementation and adjustment. It deals with, and must respect the particular circumstances – the ecosystem stresses, economic situations, community assets, historical legacies, public preferences and so on – that are particular to the case at hand. But

the intent is for these individual, situation specific decisions also to contribute to an overall transition to behaviour that is on all fronts increasingly sustainable.

The full range of sustainability concerns and objectives therefore includes matters at two levels – what we want to avoid or encourage generally, and what is specific to the particular context. The general level is the starting point.

A voluminous literature on sustainability seeks to define the basics of "sustainable development" or "sustainability" in and through universally applicable categories, principles, criteria. Predictably there is considerable variation in interpretation and emphasis. But there is broad agreement on the core components.

A working understanding of sustainability for assessment purposes

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.[8] 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 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.

[8] For a discussion of the pillars approaches, see D. Mebratu, "Sustainability and Sustainable Development: Historical and Conceptual Review, *Environmental Impact Assessment Review*, 18 (1998), pp.493-520. CIDA takes five pillar approach. See CIDA, *Our Commitment to Sustainable Development* (Ottawa/Hull: CIDA, December 1997), chapter 2, "The Sustainable Development Framework".

Many non-pillar approaches have been proposed. Some are not much more than eclectic lists.[9] Others suffer from the narrowing inclinations of those focused on particular applications.[10] But there are still many that attempt to consolidate the full range of considerations from the most advanced thinking.

While the consolidations do not agree on how to categorize the results, they reflect broad agreement on the key considerations. The sets of sustainability criteria prepared for environmental assessment applications by Clive George centre on present and future equity, combining ecological and socio-economic considerations.[11] 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.[12] Neil Harrison 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.[13] Other authors have proposed other organizational

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[9] 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
– United Kingdom, *A Better Quality of Life* (London: Gov.UK, 1999), summary [http://www.sustainable-development.gov.uk/uk_strategy/quality/life/summary]

[10] For example, the nine "Hannover principles of design for sustainability" 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 ? ows.
• Understand the limitations of design.
• Seek constant improvement by the sharing of knowledge.
– William McDonough and Michael Braungart, *The Hannover Principles: Design for Sustainability* (New York, New York: W. McDonough Architects, 1992).

[11] Clive George, "Testing for sustainable development through environmental assessment," *Environmental Impact Assessment Review* 19 (1999). pp.175-200.

[12] Keith Pezzoli, "Sustainable Development: a transdisciplinary overview of the literature," *Journal of Environmental Planning and Management* 40:5 (1997), pp.549-574.

[13] Neil E. Harrison, *Constructing Sustainable Development* (New York: SUNY, 2000), esp. pp.99-118.

frameworks. But the categorizations are not as important as the essential substance, and on this George, Pezzoli, Harrison and other consolidators generally agree. Given the contested history of the sustainable development concept, this consensus is surprising and welcome.

Building on the key elements of agreement from the last dozen and more years of thinking and experimentation on sustainability and its application, the box below presents a set of basic sustainability requirements or obligations of sustainability-oriented decision makers.[14] 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.

General sustainability requirements

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

Sufficiency and opportunity
Ensure that everyone 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.

Equity
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.

Efficiency and throughput reduction
Provide a larger base for ensuring sustainable livelihoods for all while reducing threats to the long term integrity of socio-ecological systems by avoiding waste and reducing overall material and energy use per unit of benefit.

Democracy and civility
Build the capacity, motivation and habitual inclination of individuals, communities and other collective decision-making bodies to apply sustainability requirements through more open and

[14] An earlier version of this set of requirements was presented and discussed in Robert B. Gibson, *Specification of sustainability-based environmental assessment decision criteria and implications for determining "significance" in environmental assessment*, monograph prepared under a contribution agreement with the Canadian Environmental Assessment Agency Research and Development Program, revised January 2002, see esp. pp.8-17

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.

Precaution and adaptation
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.

Immediate and long term integration
Apply all requirements of sustainability together as a set of interdependent parts, seeking mutually supportive benefits.

This is just 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.[15] 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. More importantly, this listing only sets out the general requirements. 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.

The substance of this list of core sustainability requirements does, however, have some clear and immediate implications. The package represents the foundational justification for the "basic design features of best practice sustainability assessment processes" set out earlier. No less importantly it stands as a basic set of criteria for sustainability assessment evaluations and decisions. And, as will be discussed below, it provides a useful working framework for identifying and considering serious trade-off problems.

Clearly, 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 five 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.

In sustainability assessments integration entails some careful thinking about

- how to aggregate evaluations of expected effects, positive and negative, assured and speculative, within each requirement category (e.g. likely short term integrity losses versus possible long term gains);

[15] Ibid.

- how to compare, and possibly trade off anticipated gains and losses between categories (e.g. sufficiency gains against integrity losses);
- how to aggregate overall results to compare alternative policies, programs, plans or projects;
- what generic rules can be accepted (e.g. net overall effects must be positive; no significant long term loss can be accepted in any category; option promising the greatest long term gain overall must be chosen); and
- what processes (with what participants, openness, information base, resources, etc.) should be adopted for resolving these matters in general and in particular cases and contexts.
- how to enhance existing consultative, evaluative and decision making tools (e.g. conventional cost-benefit, net positive value and multiple accounts analysis tools) to assist sustainability assessment deliberations.

All of these are long standing issues that have been addressed in a wide range of evaluation and decision processes. Sustainability assessment applications present some fresh challenges, to be sure. But there is plenty of experience and a plethora of tools and methodologies to adopt and adjust. Some of the problems and possibilities here can be illustrated through consideration of possible responses to the trade-offs problem.

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 program and project decisions if only because overall global conditions are now so very far from sustainability and the situation in development assistance target areas is predictably less cheerful than the overall situation.

In cases involving narrow environmental assessments, 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.

The key trade-off issues are which ones are most significant (given that contribution to sustainability is the objective)? which ones are most (or least) acceptable, in general and in particular circumstances? and how should these decisions be made?

Common trade-off decisions include

- compensations and substitutions (direct and indirect compensation for, rather than full mitigation of, negative effects), for example,
  - later rehabilitation of aggregate mining operations on agricultural lands that are now at least somewhat degraded (substitution in time)

  - a constructed wetland to replace relatively natural one (substitution in place)
  - new community recreational facilities compensating for risks to traditional hunting or fishing (substitution in kind).
- net gain and loss calculations (aggregation of net gain and net loss calculations), for example,
  - reduction of near term ecological damage risks from surface storage of toxic wastes balanced against smaller but long term risks from initially secure deep underground disposal (differences in time);
  - major damages to the interests of tribal people displaced by a new dam balanced against more material security for larger numbers of poor farmers downstream (differences in place); and
  - efficiency gains from industrial process improvements balanced against associated job losses (differences in kind, across requirements).

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.
Nevertheless, perhaps few set rules will be appropriate for all cases (different communities, cultures, ecosystems, stresses, aspirations, capacities, etc.) even within particular regions or sectors.

Processes: Where the general rules are insufficient, sustainability assessment regimes can provide guidance on selection and use of appropriate processes for making context-specific decisions on which trade-offs are or may be worthy of careful attention and which ones are or may be acceptable in specific situations. The processes can include use of some of the many more or less elaborate 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 very helpful, 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, is therefore crucial.

Possible general rules for decisions about trade-offs and compromises

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-offs must be explicitly identified and the most desirable option among the alternatives must be chosen; and
- all significant trade-offs must be addressed and justified explicitly and openly.

Additional general rule possibilities include the following:
- no "significant" compromises or trade-offs are permitted, unless approved by all relevant stakeholders;
- compromises and trade-offs in (all or specified) sustainability-related matters are undesirable unless proven otherwise; the burden of proof falls on the proponent of any compromise or trade-off;
- 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);
- 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);
- no displacement of (significant, net, any) negative effects from the present to the future can be justified ;
- no enhancement can be accepted as an acceptable trade-off against incomplete mitigation if stronger mitigation efforts are feasible;
- only compromises or trade-offs leading to, or compatible with, substantial net positive long term effects are acceptable; and/or
- no compromises or trade-offs are acceptable if they entail further declines or risks of decline in officially recognized areas of concern (set out in specified official national or other sustainability strategies, plans, etc.).

Perhaps several of these additional rules would be appropriate in most jurisdictions and for most specific applications. But clearly we are entering a gray area here. Sooner or later we get to situations where exceptions should be made or where a different approach would serve the general requirements more effectively. Always there will be particular circumstances to respect. Where general rules are not sufficient, processes for dealing with the particulars are needed.

General trade-off decision process considerations

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.

These considerations can be addressed in different ways, through processes with different characteristics. In all cases, however, the process design choices should respect the three core rules for trade-off decisions set out above. Adjusted for trade-off process design purposes they are as follows:

- trade-off decision processes must serve the fundamental objective of net sustainability gain.
- these processes must ensure that all "significant" compromises and trade-offs are explicitly identified and that the most desirable option among the alternatives is chosen; and
- they must ensure that all significant trade-offs are identified and addressed and that the decisions made are justified explicitly and openly.

Because time, capacities and resources are limited, there will always be some pressures to sacrifice desirable procedural qualities. These are unlikely to be fatal so long as the core rules of net overall gains, best options and explicit justification are not compromised.

Next steps

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 *ad hoc* processes. But sometimes it will be possible to make creative use of existing legislated regimes such as in the Voisey's Bay environmental assessment case, or to legislate new mechanisms with sustainability assessment capacities, such as for regional growth management strategy development in British Columbia.

Expanded versions of existing strategic and project level environmental assessment processes have great potential as vehicles for sustainability assessment. Arguably they have for some time been evolving in the direction of sustainability assessment. With some exceptions (British Columbia among them) environmental assessment processes today incorporate more of the basic design features of best practice sustainability assessment processes than they did ten and twenty years ago.

Further progress in this direction is both plausible and desirable. It is not entirely risk free, however. One of the great challenges of environmental assessment 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 environmental assessment. But the gains so far have been limited and remain fragile in many jurisdictions. Steps to introduce broader sustainability assessment should root environmental considerations more deeply in the core of deliberations and decisions at the strategic as well as project levels. But because sustainability assessment integrates the ecological and community concerns with other social, economic and political factors, badly designed sustainability assessment processes could lead to less direct attention to environmental issues and reverse some of the hard won gains of the past three decades.

New or adjusted assessment processes that ensure attention to the full suite of sustainability requirements, and incorporate all of the basic process characteristics listed above, are unlikely to threaten any past gains. But putting such processes in place is not likely to be achieved in one step. The risk lies in ill-conceived or poorly implemented incremental changes.

Two 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, multistakeholder 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.

That said, it does seem reasonable to proceed with efforts focused on environmental assessment regimes. Chief among these should be initiatives

- to revise laws and processes to clarify sustainability purposes and facilitate practical transition from the mitigation focus to positive contributions to sustainability improvement, and
- to work out more of the details on such matters as how to specify sustainability requirements and how to deal with trade-offs generally and in particular circumstances.