A Strategy For Effective Ecological Development (SEED): A Model Sustainable Planning Process

by

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Abstract: This paper describes a model — a Strategy for Effective Ecological Development (SEED) — for guiding residential site development. It offers a generic planning process that can be applied to a variety of settings; demonstrates how the global and regional situations are concretely affected by what is done at the site level, and inserts regional and local issues and challenges into the site planning process. The paper lays out a series of steps — from context-setting to post-project monitoring and dissemination — that will enable residential developments to reduce their ecological footprint, and to contribute to more sustainable urban development patterns.

1. Introduction

The expression "think globally, act locally" has been a foundation of sustainable development literature and planning initiatives for many years. Yet despite its widespread acceptance, a clear and comprehensive approach that conceptualizes the local planning process in consideration of global ecological issues, and applies sustainable development principles at the residential site level, has failed to materialize.

Attempts have been made to do this. The Center for Maximum Potential Building Systems in Austin, Texas has produced what they call a “Biom-Metric™” planning and design methodology which “interconnects global biome-based information-sharing with on-site physical development.”[1] In addition, the Rocky Mountain Institute has produced a textbook on the subject.[2] Much can also be learned from the theory and practice of environmental assessment which, in its more advanced manifestations, has placed a strong stress on consideration of alternative site uses and post-project monitoring.[3] Numerous methodologies for making individual buildings as environmentally responsible as possible are also available.[4] However, a simple and easy-to-use, yet relatively comprehensive, planning process for linking global, regional, and local issues of concern to site design does not yet exist.

The most advanced work done to date in Canada in this general topic area is that of the Sheltair Group, which produced a path-breaking policy report for the City of Vancouver to assist in the planning
of a model sustainable community at Southeast False Creek, hereafter referred to as the “Sheltair report.”[5] The Sheltair report presents a comprehensive framework, beginning with a general definition of sustainable urban development, and then developing into increasing levels of specificity (working principles, spheres of sustainability, categories, goals and objectives) until it reaches the stage of indicator identification and target setting.

The strength of the Sheltair report, from which we have learned a great deal, is its comprehensiveness, which makes it an excellent reference document. Building on this work, and that of other theorists and practitioners of urban sustainability,[6] this paper proposes an integrated approach to the application of sustainable urban development principles to the residential site level and identifies a strategy for the creation of appropriate site-specific development guidelines. The Strategy for Effective Ecological Development (SEED) is distinguished by the following characteristics:

- it models a generic planning process that can be applied to a variety of settings;
- it demonstrates how the global and regional situations are concretely affected by what we do at the site level; and, finally,
- it systematically places regional and local issues and challenges into the site planning process.

The goals of the SEED process are twofold: (1) to create a Development Action Plan based on a comprehensive understanding of global, regional, local and site specific issues and goals, opportunities and constraints, and (2) to develop a richer understanding of how urban developments can be designed so they contribute towards a more sustainable future both locally and globally.

In order to illustrate how the SEED process can be applied to local site development within the limited constraints of this paper, we have chosen to use a single development context: an inner city "brownfield" site. The SEED process, however, can be applied equally well to other development contexts.

2. Integrating Theoretical Perspectives

All urban planning decisions have significant consequences for the environment. Depending on the nature of the development, these decisions may have local, regional and/or global implications. Examining these ecological consequences is consistent with a "carrying capacity" approach to sustainability wherein the ability of ecosystems to maintain their ecological integrity and resilience – while providing resources, waste assimilation functions, and life support services on a continuing basis – is emphasized. A carrying capacity approach starts from an understanding of what the ecosystem can support. It is also compatible with a "throughput" approach to sustainability in which the focus is on analysis of the consumption of energy and raw materials, and the production of waste and various types
of pollution. A throughput approach starts from what humans are taking from, and putting into, the ecosystem. These are just two different ways of measuring the ecological footprint of human activities.[7]

The SEED planning process outlined below integrates the "carrying capacity" and "throughput" approaches to sustainability, offering a framework that seeks to examine resource consumption and waste production in terms of local and regional issues affecting global carrying capacity. This integrative approach is applied in the context of ten planning sectors in which the key challenges and opportunities facing urban sustainable development at the residential site level are embodied.

3. **Toward a Sustainable Planning Process**

The focus for the remainder of this paper will be to examine each stage of SEED, introducing the key components of the strategy as they unfold over the course of a sustainable planning process, and exploring within them the complex processes of goal setting, objective selection and prioritization, analysis of strategies, consideration of "trade-offs", and design of post-project assessment. Figure 1 provides a brief overview of the six steps in the process.

| Step 1: | Itemization of local and regional goals and challenges in the context of global ecological issues; derivation of sustainable development guidelines; initiation of stakeholder participation, an element that continues throughout all stages of the development planning process |
| Step 2: | Identification of site attributes, opportunities, and constraints, in light of local and regional ecological, social, and economic issues and existing policy contexts |
| Step 3: | Formulation and prioritization of site-specific sustainable objectives and strategies; determination of knowledge gaps and research to address these gaps; analysis and reconciliation of "trade-offs" in an effort to minimize goal and design conflicts |
| Step 4: | Determination of appropriate targets, indicators and other elements of a comprehensive assessment strategy |
| Step 5: | Creation of a Development Action Plan which extends traditional development plans |
| Step 6: | Post-development assessment of project success; transfer of effective practices to other development projects and establishment of parameters for neighboring developments; sharing of project successes and failures with planning and development community and stakeholders; re-evaluation of existing policy and legislative barriers and identification of changes required in these contexts; identification of continuing monitoring requirements. |
Figure 2 depicts the flow of the planning process that is being completed through the SEED approach to planning.
Figure 2: A Flow Chart of the SEED Multi-Stage Planning Process

Step 1

Global Ecological Issues

Regional Context
Goals
Challenges

Local Context
Goals
Challenges

Sustainable Development Guidelines

Step 2

Site Opportunities
Sector(s) [Ecological, Social and Economic]

Site Constraints

Step 3

Objective Formulation
Development Strategies

Knowledge Gaps
Information

Step 4

Target / Indicator Setting

Step 5

Development Action Plan

Step 6

Post-Development Assessment and Diffusion of Experience
3.1 **Step 1: Regional Challenges and Global Awareness**

The ecological impact of buildings and development patterns extends well beyond the immediate neighborhoods in which they exist. In fact, the impact of the global built environment has the potential to directly challenge the earth's carrying capacity and the overall health of the biosphere. As a Worldwatch report notes,

Buildings account for one-sixth of the world's fresh water withdrawals, one-quarter of its wood harvest, and two-fifths of its material and energy flows. This massive resource use has massive side effects: deforestation, air and water pollution, stratospheric ozone depletion, the risk of global warming.[8]

The potential for the built form to have such devastating effects on the earth's carrying capacity signals the need to specifically incorporate global environmental perspectives into local real estate development planning processes. This is the focus of step one in the SEED planning process.

The most important global environmental problems that need to be considered are global warming, ozone depletion, declining air quality, species extinction/diminishing biodiversity, declining fisheries, declining water quality and inequitable access, declining crop yields and unsustainable agricultural practices, rain forest depletion/general deforestation, resource depletion, and overpopulation.[9] As the implications for development are assessed for each of these global issues, the goal will be to minimize the import or export of environmental problems outside the local development area, and the further degradation of local and regional ecosystems.

At this stage of the planning process, the SEED approach calls for the identification of local and regional goals that are mindful of the global context, and a delimiting of known challenges to the successful fulfillment of these goals. It is crucial that there be stakeholder participation[10] from the outset in the development of these goals. Such early involvement will ensure that all parties have full knowledge of the global environmental context and will facilitate an open dialogue between planners and developers and the communities affected by the development process.

This first stage in the SEED development process is critical. Throughout the process, the planner or developer will need to use the information developed in this stage to assess the site specific issues, site objectives, development strategies, and assessment approach against the sustainable development guidelines that arise out of the analysis of local and regional goals and challenges. While this stage in the planning process requires an initial investment of time, the guidelines developed will help form the framework for other developments within the community or region, and thus will not need to be reinvented for each new development site. Figure 3 provides an example of how identifying the goals and challenges at the local and regional level for the global ecological issue of Global Warming enables
the planner or developer, in combination with stakeholders, to derive appropriate sustainable development guidelines.

**Figure 3: Deriving Sustainable Development Guidelines for Local Developments**

<table>
<thead>
<tr>
<th>Regional Goals</th>
<th>Regional Challenges</th>
<th>Local Goals</th>
<th>Local Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Decrease CO2 emissions</td>
<td>- Implementation of new emission standards not within regional jurisdictions</td>
<td>- Reduce amount of emissions from industry or power plants</td>
<td>- Community dependent on heavy industry or fossil fuel based energy sources</td>
</tr>
<tr>
<td>- Reduce automobile reliance in the region</td>
<td>- Historical development pattern has led to separation of employment and residential areas resulting in long-distance commuting</td>
<td>- Reduce number of automobile trips</td>
<td>- Scarcity of mixed use districts</td>
</tr>
<tr>
<td>- Reduce methane emissions from landfills</td>
<td>- Current landfills serving region nearing capacity</td>
<td>- Reduce amount of organic waste going to landfills - Improve composting programs for organics</td>
<td>- Landfill located in community serves surrounding communities who control their own waste management programs</td>
</tr>
</tbody>
</table>

Once all goals and challenges have been identified, sustainable development guidelines can be derived. On the basis of the few examples provided above, the following sustainable development guidelines might be proposed:

**Sustainable Development Guidelines to Address Global Warming**

- design efficient public transportation systems
- promote use of alternative energy sources that result in fewer CO2 emissions
- diversify economy away from dependence on heavy industry
- build mixed residential, commercial and industrial districts in order to reduce mobility requirements
- develop effective composting and recycling systems
- develop educational programs on the links between greenhouse gas production and lifestyle

Deriving a development strategy that is mindful of the global environmental context is an important first step toward a more sustainable strategy for effective ecological development. The second step requires the identification of site specific opportunities and constraints so as to build a bridge between local, regional and global issues and the site specific development context.
3.2 **Step 2: Site Analysis – Opportunities and Constraints**

As we have seen in Step 1, an understanding of current and future global ecological issues is critical for planning local projects and developing guidelines for regional and local planning. Applying these guidelines at the site specific level is not, however, a simple process of translation. The attributes, opportunities and constraints of the site also need to be evaluated in the context of local and regional ecological, social, and economic concerns, and existing policy and planning priorities.

To begin this stage of SEED, development sites should be categorized in terms of site type as each type embodies unique site constraints and development opportunities. The main site types are: "greenfield" (previously undeveloped land), "brownfield" (former industrial land, often in an inner city location) and "established development" (existing urban or suburban areas where redevelopment, intensification, or infill is proposed).[11] Greenfield sites offer the opportunity to take a different approach to stormwater management – employing swales, for instance, to convey and filter stormwater rather than standard storm sewers.[12] Brownfield sites provide an opportunity to add to residential capacity without depleting farmland or habitat areas. Moreover, such sites can often make use of existing transit nodes to discourage private automobile use. In older suburban or urban neighborhoods, there are opportunities to convert former single-family lots to duplexes or fourplexes, and to add density incrementally along arterial roads.

All sites also have certain constraints. By definition, the development of greenfield sites removes ecologically valuable green space and habitat areas from the region. At best, the development can seek to increase the efficiency of land use through higher density development. Clustering housing units so as to preserve an area of the site in a natural or renaturalized state is also a possibility. In the case of brownfield sites, it is usually too late to avoid contamination of soil and groundwater, but these can be remediated to a higher standard, and sometimes habitat can be reintroduced. Experimental techniques using absorptive plants may also be employed to filter contaminated soil and provide raw material for other industries.[13] Established neighborhoods pose their own problems. It is often more difficult to make major changes to the existing infrastructure in these contexts but street re-design may be possible, as may the introduction of greywater recycling or solar energy systems.

Existing policy and zoning contexts – as well as any pertinent local and/or regional legislation that may limit possible development strategies – need to be identified and explored. A number of policy tools are available for adoption by local and regional authorities which can facilitate creative solutions to some of the constraints identified during this phase of the SEED planning process.[14]

When it comes to identifying the contextual environment in which development will occur, the importance of the political arena must not be underestimated. The political arena, and its constituency groups, may have pre-determined agendas as to what the priorities should be for a particular development. While in some cases these may be compatible with the sustainable development
guidelines derived during Step 1 of the SEED process, they may also constrain the pursuit of sustainable
development. Existing policies and priorities must be evaluated to determine whether or not they can be
used effectively or whether convincing arguments should be made that other policies would be more
beneficial. Policies and priorities that are non-negotiable, and which work against optimum sustainable
development strategies, need to be flagged for attention in the final assessment stage of the planning
process so that the planning and development community can work towards diminishing their impact on
future projects.

In order to link site planning with the defining dimensions (land, biodiversity/habitat, water and
air) of a region's carrying capacity and the throughput of its residents and visitors, SEED offers ten
planning sectors through which the constraints and opportunities of the development site can be
explored. These are: (1) green space / habitat; (2) site planning and construction; (3) energy systems; (4)
transportation and air quality; (5) waste management; (6) urban agriculture; (7) stormwater
management; (8) water and sewage treatment; (9) social sustainability (equity, livability, and
community), and (10) economic sustainability (viability, community economic development, and full
cost accounting). The sectors identified here can be seen as the "channels" through which throughput
occurs and carrying capacity at a variety of levels is affected. For instance, if reliance on the private
automobile is not minimized, there will be a further depletion of non-renewable resources (fossil fuels)
and more air pollution (including greenhouse gases) will be produced. This will further tax the waste-
assimilating capacities of the regional airshed, and of the global atmosphere, while also contributing to
further deterioration in local water quality through toxic run-off. By contrast, reducing automobile use
will improve air quality, reduce energy consumption, improve the quality of local runoff, and improve
social equity for others attempting to use streets and open spaces. It may also have economic benefits
deriving from reduced congestion. As can be seen from this example, the various sectors are intimately
linked so that progress in one sector has the potential for synergistic benefits in another.

Figure 4 provides an example of the opportunities and constraints identified for one of the ten
planning sectors for our generic brownfield site.
Figure 4: Identifying Site Specific Constraints and Opportunities

<table>
<thead>
<tr>
<th>Planning Sector: Transportation and Air Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site Opportunities</strong></td>
</tr>
<tr>
<td>- future expansion of light rail transit would intersect with development site</td>
</tr>
<tr>
<td>- increased density in neighborhood would support improved public transit service</td>
</tr>
<tr>
<td>- flexible zoning would facilitate comprehensive mixed development of residential, commercial and light industrial thus reducing residential-employment mobility patterns typical of new developments</td>
</tr>
</tbody>
</table>

3.3 Step 3: Setting Site Objectives and Deriving Strategies: An Informed Process

The third stage of the SEED planning process — objective setting and strategy determination — is probably the most important. It is the place where the local and the global intersect most clearly and the point at which there is the greatest opportunity for finding creative and effective solutions to the unsustainable development practices of the past. It is also the stage where stakeholder participation is most crucial and active.

The right cross-section[15] of community, sectoral and special interests must be invited to assist in defining the development objectives for the site so that the process acquires legitimacy and the wider community develops a shared understanding of sustainable development. This shared understanding is imperative in order to achieve agreement on site development objectives and to garner support for the difficult "trade-off" decisions that will inevitably have to be made. Progress will be severely impeded or even undermined without the direct involvement of these stakeholders.

Formulating objectives for each sector (e.g. transportation and air quality, site planning and construction) requires revisiting the sustainable development guidelines established during Step 1 and the opportunities and constraints identified in Step 2. While the terms "goals" and "objectives" are often used interchangeably, "objectives" are typically more specific, directional and measurable.[16] For example, while the goal might be to reduce CO2 emissions, the site objective might be to reduce the number of automobile trips by 35%. It is this specificity that needs to be achieved in this third stage of the SEED process.

During the process of objective identification, prioritization and strategy development, it is likely that a number of knowledge gaps will begin to appear regarding the range of possible solutions, available strategies that have been used elsewhere, and the known strengths and pitfalls that are
associated with each of the potential objectives and strategies. Ordinarily, seeking information to fill in knowledge gaps would seem to require a heavy investment in feasibility studies, site-specific analyses or even regional level state of the environment reporting. These activities are demanding in terms of human resources and funding — two things that are often in short supply. The recent proliferation of "best practice" databases, web pages, and compendiums of sustainable development initiatives should provide more collaborative ways of sharing already available research and learning from sustainable development strategies that have been implemented elsewhere.[17]

Figure 5 provides a diagram of the process for objective identification and prioritization and the development strategies that are derived and evaluated during this stage.

Figure 5: Bringing Global and Local Issues Together: Objective Formulation and Development of Implementation Strategies
Once site objectives have been enumerated, the task is to identify as many different strategies as possible for achieving each site objective. In order to assess which strategies will produce the most significant contribution towards a sustainable development, each one must be examined as to its ability to meet the other objectives within its planning sector, and its ability to meet objectives in the other site planning sectors. It is also important to examine whether a strategy has been used in other developments and its effectiveness in meeting the objectives of that development. While all strategies seek to fulfill the sustainable development guidelines outlined in Step 1, it is possible that some strategies are more useful in a given development context than others, or are less effective when combined with other strategies.

It is equally important to recognize that different strategies have different timelines for reaching the desired objective. Both short-term and long-term strategies should be incorporated into the development plan to ensure that progress continues to be made towards sustainable development after the initial development phase. It is also important to consider the degree of flexibility possessed by longer-term strategies — particularly in "phased-in" developments — as the aging of the development may bring to the forefront new goals, objectives or more attractive alternative strategies. An analysis of these different factors will enable the planners, developers and stakeholders to ultimately give the strategy a priority rating.

Figures 6 and 7 present an example of the considerations outlined above.

**Figure 6: Defining Site Objectives and Deriving Potential Development Strategies**

<table>
<thead>
<tr>
<th>Planning Sector: Transportation and Air Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective A</strong>&lt;br&gt;- decrease personal car trips by 10%</td>
</tr>
<tr>
<td><strong>Objective B</strong>&lt;br&gt;- reduce car dependence for trips between residential, and commercial sectors</td>
</tr>
<tr>
<td><strong>Objective C</strong>&lt;br&gt;- ensure community is pedestrian-friendly</td>
</tr>
<tr>
<td><strong>Strategy 1</strong>&lt;br&gt;- lobby for expansion of light rail transit stop within community</td>
</tr>
<tr>
<td><strong>Strategy 2</strong>&lt;br&gt;- institute local commuter bus within community</td>
</tr>
<tr>
<td><strong>Strategy 3</strong>&lt;br&gt;- develop ride-sharing program within community</td>
</tr>
<tr>
<td><strong>Strategy 1</strong>&lt;br&gt;- design mixed use development (residential, commercial, light industrial)</td>
</tr>
<tr>
<td><strong>Strategy 2</strong>&lt;br&gt;- rezone residential areas for more live/work opportunities</td>
</tr>
<tr>
<td><strong>Strategy 3</strong>&lt;br&gt;- provide incentives to businesses to locate within community</td>
</tr>
<tr>
<td><strong>Strategy 1</strong>&lt;br&gt;- develop site plan so as to have all residential units within 5 minute walking radius of the community core</td>
</tr>
<tr>
<td><strong>Strategy 2</strong>&lt;br&gt;- provide bike routes and walking paths throughout development site</td>
</tr>
<tr>
<td><strong>Strategy 3</strong>&lt;br&gt;- use effective street design to minimize traffic and speed of automobiles</td>
</tr>
</tbody>
</table>
Once information similar to that presented in Figures 6 and 7 has been gathered for each development strategy, the process of prioritizing objectives and selecting strategies can proceed using an informed “trade-off” process. Of course, there is no limit on the final number of objectives and strategies that can be transferred to the Development Action Plan. Where possible, however, efforts should be made to maximize the impact of each objective and each strategy, especially in terms of producing positive results in other sectors. In general, strategies should be kept to a manageable number.

Ensuring that the development plan is successful in meeting the objectives outlined in this stage of the SEED process is the focus of Step 4, which involves the determination of targets, indicators and other elements of a comprehensive assessment strategy.

### 3.4 Step 4: Designing an Effective and Comprehensive Assessment Strategy

Without specific targets, goals, guidelines, and objectives are tantamount to “motherhood” statements. To truly “think globally, act locally,” sites must be developed to ensure that local, regional and global carrying capacities are respected and to minimize residents’ throughput. Clearly defined assessment strategies, with specified targets and indicators, provide a "directional" context whereby planners, developers, stakeholders and the community at large can see how their actions can contribute to the environmental and social improvement of their regions. They also establish an accountability framework which facilitates compliance, and which can ensure political support for other sustainable development initiatives in the future.

The challenge is to identify appropriate targets and assessment criteria that will enable effective and efficient future monitoring and evaluation. In the absence of an agreed upon master set of
sustainable development indicators reflecting an accurate knowledge of carrying capacity, site-specific indicators should be selected or developed based on the following principles.[18]

**Figure 8: In Search of Sustainable Development Indicators**

- Sustainable Development indicators must have a direct correspondence to one of the site objectives articulated in Figure 6, and the strategies derived and evaluated in Figure 7;
- Any single objective may have multiple indicators that assess progress from different angles and which can respond to the multi-dimensionality of some of the site development objectives;
- Indicators must be clear and explicit so that what they are measuring, and what may be inferred from their results, is self-evident;
- If used in comparative situations, indicators must be flexible enough to capture a certain amount of local and regional variation;
- Indicators must be benchmarked in consideration of historical trends and divergences; and,
- Indicators must not become the sole determinants of decision making; they must be seen as aids to a better understanding of trends and changes.

At the preliminary stage of indicator selection it is desirable to keep the spectrum of potential indicators as wide as possible rather than eliminate a potential indicator prematurely.

Indicators can be constructed to do different things. On the one hand, they can be specifically derived from the development objectives and strategies which will lead to fairly focused and typically quantitative indicators (e.g. amount of paved surface per capita, fuel consumption per capita, vehicle miles travelled per capita, ratio of exposed surface to volume area, proportion of green space in development, proportion of affordable housing stock, etc.). On the other hand, they may seek to provide a more general indicator of the development's success, reflecting the level of generality embodied in sustainable development guidelines from Step 1. These indicators are more difficult to devise because they often purport to measure such amorphous notions as “quality of life.” It may be more effective, therefore, to measure "quality of life" by amassing a number of finer indicators that measure its individual components — such as opportunity for recreational activity, opportunity for participation in local governance, and so on. In some ways, this aspect of the assessment process can be seen as a return to the broader purview embodied in Step 1.

Targets should be chosen based on empirical knowledge of the kinds of performance that can be expected from design or program innovations, and from relevant precedents. In the Southeast False Creek case, Sheltair created a reference database that was used for target development. For example, when setting targets for waste production, Sheltair used as “reference values” the Greater Vancouver Regional District average of 580 kilograms per person per year, and the best Canadian practice from the community of Belleville, Ontario (380 kilograms per person per year).[19] Similar information exists on the kinds of improvements that can be expected in energy efficiency on the basis of increased density,
and in water quality on the basis of reduced permeability. These information resources are valuable assets in establishing targets.[20]

Once an exhaustive list of sustainable development indicators has been identified, each needs to be reassessed by asking the following questions:

**Figure 9: Assessing Sustainable Development Indicators**

- How easy is it to obtain the information needed for the indicator?
- How easy will it be to continue monitoring the indicator in the future?
- Are the indicators mutually exclusive (i.e. are they each measuring something different?)? If not, which indicator is the most straightforward measure?
- Are any of the indicators inherently in conflict? If so, is it possible that the development objectives are in conflict and should they be re-examined?
- Do the indicators capture the multi-dimensionality of the underlying development objectives?
- Are there other indicators being used locally, regionally or nationally for the development objective that is being measured? If so, should that indicator be used so as to facilitate local, regional or national comparison?
- Can the results for the indicator be effectively communicated to the public and easily understood by politicians and other decision-makers?

While indicator identification is a fundamental component of effective assessment, this is merely one part of a more comprehensive framework. Another important element is the creation of a Development Steering Committee (DSC) comprised of representatives from the planning and development communities, stakeholder groups and other interested individuals, that will be charged with the short and long-term stewardship and monitoring of the development to ensure that objectives are being met, and progress is being made towards targets. The DSC must also take responsibility for determining monitoring time frames, communicating achievement of objectives, and raising public awareness about the success and limits of the development plan. Ensuring integration of the development plan with future neighboring developments is equally critical. Local and regional goals cannot be fully realized at a site level if future neighboring developments do not mesh well with the existing sustainable community.

### 3.5 Step 5: From Drawing Boards to Development Action Plans

At present, Official Development Plans (ODPs) are a codification of the principles and characteristics that traditional development processes have determined should guide the actual development. The ODP’s official role is as a "guide to the preparation of the zoning by-laws, housing programs, community facilities agreements, servicing designs and agreements, and all other instruments
which implement it."[21] While they have significant power to shape the nature of development, ODPs are prepared with sufficient generality in order to permit flexibility in the realization of a development. It is the goal of the Development Action Plan, envisioned as part of the SEED planning process, to add specificity to present ODPs in order to ensure that there is compliance with the sustainable development guidelines, goals and objectives derived through the planning process. Moreover, Development Action Plans would be expanded to include the specific strategies that are to be used to realize the development’s sustainability objectives. We also envision the inclusion of targets and an assessment strategy so that the public can judge whether the development is progressing towards achieving its goals. An implementation schedule of actions required in order to proceed with development (e.g. by-law amendments, re-zoning, etc.) also needs to be clearly articulated.

Although it is possible for developments which deviate from existing official development plans to be challenged and potentially to have development permits revoked, this is a time-consuming process and requires lengthy and complex hearings regarding the "intentions" of the Official Development Plan. By adding the level of specificity sought above in the SEED's Development Action Plan, there should be less ambiguity about intentions and less room during the development stage to drift away from the sustainable objectives of the project.

3.6 Step 6: Getting Progressively Better – Sharing the Development Experience

It is tempting to end the planning process at this point. After all, clearly articulated site objectives and development implementation strategies have been identified, support for the development has been garnered from all important stakeholders, targets have been set and a Development Action Plan has been created. However, until such time as there is "translation" of the development project's successes into more widespread codes and practices, the opportunity for enhancing global sustainability is reduced.

The final stage in the Strategy for Effective Ecological Development is therefore a comprehensive retrospective assessment of how well the planning process functioned and, over time, how successful the development project was in progressing towards a more sustainable future. The Development Steering Committee identified in Step 4 will be partly responsible for this assessment, but there is also an equal opportunity for the planners or developers who initiated the development to examine how the process could be improved for the future.

Communicating the development project's experiences, successes and failures is a crucial component of collectively working towards a more sustainable future. The vital act of selecting development strategies on the basis of previous precedents, best practices, and other development experiences cannot exist without the willingness of planners/developers to transfer the knowledge they have gained to their colleagues.
This final stage of the SEED planning process is also the time when planners and developers need to re-examine the regional and local challenges identified in Step 1, as well as the site constraints in Step 3, to determine if there are existing policy or legislative barriers they need to work toward resolving so that these do not become factors in future projects.

4. Conclusion

Over the course of this paper, we have outlined a planning strategy that seeks to integrate two theoretical approaches to sustainability - "carrying capacity" and "throughput" - by combining global, regional and local perspectives with the constraints and opportunities present at the local development site. Such an approach calls for a process that is participatory, comprehensive, creative, informed by best practice, and accountable for its objectives through an extensive assessment strategy. It is also a planning approach that seeks to move the planning and development community forward in its stated goal of finding more sustainable approaches to development. It will succeed to the extent that lessons are shared, knowledge is gained, and the desire to improve continues to exist. If practiced as envisioned, the Strategy for Effective Ecological Development could lead us a step further towards developing a more sustainable future, both locally and globally.
END-NOTES

[7] The "ecological footprint" concept measures the extent to which people and their throughput exceed regional carrying capacity, or their share of global carrying capacity. Its initiators, Rees and Wackernagel, have given the "footprint" a spatial dimension by calculating how much land is needed to produce resources and assimilate waste for a given population. For a more in-depth discussion of the concept, see Mathis Wackernagel and William Rees, Our Ecological Footprint: Reducing Human Impact on the Earth (Gabriola Island, B.C.: New Society Publishers, 1995).
[10] Such stakeholder input may take one of two forms: "initiating" or "evaluative." In the former, stakeholders are asked to assist with the identification of goals and challenges at the local and regional level for each global ecological issue. While this may be seen as the full embodiment of participatory stakeholder involvement, it may be equally effective to pursue an "evaluative" approach. The main feature of this latter type of involvement is that the local planning office uses its expertise to develop a preliminary position paper outlining the known local and regional goals and challenges. Stakeholders are then asked to provide feedback on this paper and to offer additional and/or alternative goals and challenges. If this latter approach is carried out in an open and iterative manner, stakeholders should feel they are making an equally effective contribution as in the "initiating" approach.
[11] An additional categorization that may be useful in some circumstances is the distinction between "historic centre" (typically these are the heritage areas of a city that are pivotal for identifying and defining a city's character), "new core" (the area surrounding the historic centre which often is the focus of business and commercial activity), and "hinterland" (the outlying areas that ensure the city's survival both in terms of a population base and in terms of resource provision). These latter distinctions are useful especially when identifying the social and economic implications of the development project.

[12] One of the pioneers of more sustainable approaches to the planning of greenfield sites is Patrick Condon, The James Taylor Chair in Landscape and Livable Environments, School of Landscape Architecture, University of British Columbia. Condon is also extending his efforts to encompass brownfield and existing residential neighbourhoods. For information on his greenfield work, see Patrick Condon (ed.), Sustainable Urban Landscapes: The Surrey Design Charrette (Vancouver: UBC Press, 1996). See also the web site: www.agsci.ubc.ca/jamestaylorchair/SurreyProject.html
[13] Information on this and other innovative building, development, and remediation techniques can be gleaned from “Green Clips,” a fortnightly e-mail newsletter that is available free by subscription. For more information on subscriptions, and archiving of back issues, contact GreenClips@aol.com
For an excellent discussion of policy tools and case studies of how they have been used effectively, see European Commission on Sustainable Development [note 11].

The process of considering site attributes, opportunities, and constraints will be enhanced if a multi-disciplinary team is involved, including ecologists. In some cases, it may be useful to carry out a landscape assessment of the site. For some tips on how to do this, see Michael von Hausen, *Eco-Plan: Community Ecological Planning and Design* (Vancouver: self-published, n.d.). For more information, call (604) 536-3990.

An extension of the definition used in the Sheltair Report [see note 5].

In addition to the Sheltair Group’s report [see note 5], readers might also wish to consult Hygeia Consulting and REIC Ltd., *Changing Values, Changing Communities: A Guide to the Development of Healthy, Sustainable Communities* (Ottawa: Canadian Mortgage and Housing Corporation, 1997). There are also a number of useful web sites. These include: the International Institute for Sustainable Development (http://iisd.iisd.ca/); the Pembina Institute (http://www.pembina.org); the Sustainable Communities Network (http://www.sustainable.org); the Virtual Library on Urban Environmental Management (http://www.soctitech.ac.jp/uem); Environmental Building News (http://www.ebuild.com/).


See Sheltair [note 6], pp. 63-66.
