

An Analysis of the Applicability of Environmental and Urban Assessment Methods: The Case of the Fazenda Tizo Park in São Paulo

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Abstract

While numerous assessment methods aimed at the ensuring the sustainability of isolated buildings and the performance of their constituent systems have been developed throughout the world, a range of new environmental assessment systems has recently emerged that take into account neighborhood, land subdivision and urbanistic concerns. They integrate the principles of smart growth, sustainable development and green building, such as Leadership in Energy and Environmental Design for Neighborhood Developments Rating System (LEED-ND), developed in the United States; *Approche Environnementale de l'Urbanisme* (AEU), developed in France; Global Reporting Initiative (GRI) Sustainability Report Guidelines, developed by United Nations; and many others. With new sustainability paradigms and difficulties on dealing specifically with sustainable grows, there are needs on selecting criteria, strategies and measurable indicators in order to anchoring formulation, controlling implementation and evaluating results of urban policies in sustainable basis, according to the proposed guidelines of Global and Brazilian Agendas 21. However, land sub-division is a model of urban growth that would cause significant impacts in landscape and ecology and, consequently, in the activities of urban planning. This paper sets out to aid understanding, on the basis of qualitative and comparative critical analysis, of the many environmental assessment methods for urban land subdivision, with particular attention paid to the advantages and disadvantages, applicability and results of such methods. Inserted in the concept of urban land sub-division, Fazenda Tizo Park, a preservation green area of the city of São Paulo, is used as a case study. The result is a set of guidelines to assist decision makers to select better locations and design and standards for the conception, design and construction of the Park.

Keywords: urban sustainability, environmental assessment, land use, land subdivision, LEED-ND, AEU, GRI

1. Introduction

The global consensus enshrined in Agenda 21, adopted by 179 countries at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, symbolized active international concern to promote wholesome and livable cities. The Rio de Janeiro Conference was followed by the 2nd United Nations Conference on Human Settlements (Habitat II), held in Istanbul in 1996. On a domestic level, Brazil's Agenda 21 (Bezerra and Fernandes, 2000), focusing on environmental, social and economic sustainability issues, advocates that individual municipalities should be responsible for the elaboration, revision and implementation of management plans, urbanistic legislation, land use and occupation laws, all aimed at ensuring the sustainability of our cities. The present paper addresses one of the aspects of our own Agenda 21: land subdivision.

Cities are not static entities. Rather, they resemble live organisms, constantly moving and growing, impelled by a number of different forces. It follows that in order to drive the preservation process, it is vital to devolve responsibility to the agents involved such as, among others, ecologists, planners, development and monitoring authorities, policy and decision-makers. Antrop's study (2001) illustrates the principal shared concepts of landscape ecologists and planners. When planners participate effectively in land subdivision projects with the intention of ensuring coherent interaction of such projects with the elements of nature, they play a key role in the final urban design (Abiko and Barreiros, 1998). According to Mascaró (2005), urban settlements modify and impact on the natural ecosystem of the subdivided land, depending predominantly on how the urban planner chooses to deal with the various environmental criteria. However, the traditional approach to the urbanization of land subdivisions often begins with the removal of as much vegetation as is legally permissible in order to produce a more substantial saleable area and, as a consequence, a higher financial return (Takaoka et al., 2006). The hedonic model mooted by Geoghegan (2002) nevertheless demonstrates that the preservation of "permanent" and "developable" open spaces in effect aggregates value to the price of a specific piece of land while serving at the same time to raise the price of adjacent residential land. Legislation however does not always favor the above. While in the course of the widespread urbanization process in the United States, according to Align et al. (2004), "in 1999 approximately 1000 measures were introduced in state legislatures to change planning laws and to make development in the US more orderly and conserving", in Brazil on the other hand Mascaró (2005, p. 16-17) - in his comparison of urbanistic and environmental laws - points to the manifest gap between them (Fig. 1).

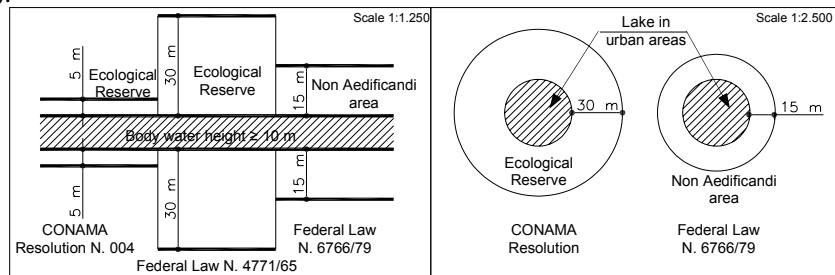


Figure 1: The gap between environmental (CONAMA) and urbanistic legislation (Brazilian Federal Laws 4771/ 65 and 6766/79)

Given the new sustainability paradigms and more specifically the difficulties involved in addressing sustainable growth, a need exists to select the right criteria, strategies and measurable indicators for anchoring formulation, tracking implementation and evaluating the results of urban policies on a sustainable basis. Mota (2003, p. 290) affirms that urbanistic indicators must be defined that take full account of environmental preservation in the land occupation process. Basically, these indicators should reflect the lowest ecological impact linked to economic viability and social wellbeing.

In line with the Habitat II concept of international and technical cooperation and information exchange, the main objective of the present paper is to seek to provide an answer to the following question: how environmental assessment methods of urban land subdivision projects address aspects of urban sustainability? This calls for an analysis of the advantages and disadvantages of some of the existing methods, focusing on the scope for the applicability and projected results of each method. Secondly, the paper seeks to provide a qualitative and comparative critical analysis of three methods of environmental assessment of urban land subdivision (with three different origins) insofar as they may apply to a specific Brazilian case. Two methods have been developed by entities of productive chain agents that deal primarily with sustainability in a civil construction context - LEED-ND (U.S.A.) and AEU (France). The third has been developed by a United Nations environmental program - GRI.

As an example of the concept of urban land subdivision, Fazenda Tizo Park (a green preservation area in São Paulo) is used as a case study. The main objective is to try to understand the environmental inputs afforded by each of the three methods and thereafter to suggest a set of guidelines to assist decision-makers to select better locations, improve design and demand higher standards for the conception, design and construction of the Park.

2. Case study: the Fazenda Tizo park

As part of the Green Belt Biosphere Reserve, recognized by UNESCO, in the Metropolitan Region of São Paulo (RMSP), the area earmarked for the Fazenda Tizo Park covers 1.500.000 m², in the western zone of the RMSP (SMA, 2006). The area is located in the metropolitan urban mesh and despite being surrounded by residential zones, industries and public areas, it possesses no parks or green areas at present. Over 60% of the area is covered by the Mata Atlântica, an important Brazilian 'native forest' which (conserved or regenerated) remains home to various threatened species of fauna and flora. The other 30% of the area is brownfield consisting of hilly terrain, farms and cultivated fields as well as an area of land contaminated by an old dump ("bota-fora"). The area is divided into two by a highway called the Rodoanel (ringroad), a key regional corridor located at the edge of the urban net and representing the main potential for connectivity with the biodiversity of the remaining Mata Atlântica. The principal uses of the land and the 35.000 m² of wetlands and many water bodies appear at Figure 2.

The fact that no particular purpose had been designated for the area has led over time to a variety of different pressures, including a spate of disorderly occupation. In response, the Environmental Secretariat of the State of São Paulo (SMA) set up the Fazenda Tizo Park with the primary aim of

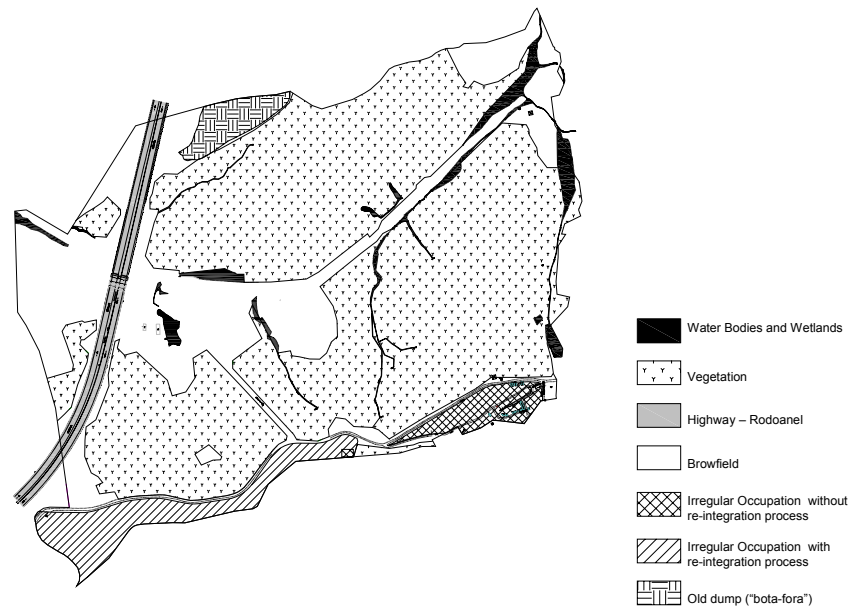


Figure 2: Fazenda Tizo Park project – Scale 1:20.000 (SMA, 2006)

The fact that no particular purpose had been designated for the area has led over time to a variety of different pressures, including a spate of disorderly occupation. In response, the Environmental Secretariat of the State of São Paulo (SMA) set up the Fazenda Tizo Park with the primary aim of ensuring the preservation of an important State-owned asset. While the project was being drawn up and developed the area was isolated, protected, and monitored to prevent further degradation. Current guidelines for land use include: the preservation and improvement of existing vegetation, research on forest management in urban areas, support for the rehabilitation of degraded areas and encouragement of public recreational use and environmental education. The project is still at the conception stage: the main current premise is to confine occupation to already degraded areas and to adopt low environmental impact sustainability criteria in respect of all interventions and buildings. A further key premise is that there must be future continuing management of the Fazenda Tizo Park as well as appropriate administration of the environmental assets – the latter to include the fostering of partnerships with local municipal authorities, universities and the private sector. The basic project has: (i) an area dedicated to recreation, with equipments to be erected exclusively for activities compatible with available support capacity; (ii) a nursery for growing plants to aid recovery of degraded areas in the park; (iii) premises installed for research and technology outreach; (iv) a Visitors Center and administration unit; (v) trails and lookout points.

3. Assessment methodologies for environmental and urban sustainability

In line with the many assessment methods developed worldwide for the sustainability of isolated buildings and the performance of their constituent systems [see Larsson (2004)], new environmental assessment systems have recently been proposed that take account of neighborhoods, land subdivision and urbanistic issues, together with the sustainability potential of so-called “green buildings”. This

paper attempts an analytical summary of three of these assessment methods, paying particular attention to their environmental relevance and applicability to our case study – the Fazenda Tizo Park.

3.1 LEED-ND

According to the USGBC (2009), the Leadership in Energy and Environmental Design for Neighborhood Developments Rating System (LEED-ND) was developed by a partnership consisting of the Congress for New Urbanism, the Natural Resources Defense Council and the U.S. Green Building Council, and a balloted version became available in 2009. Based on best practices, LEED is firmly based on a combination of environmental principles and practicable energy use, both of which are brought together in the form of consolidated norms, plus recommendations put forward by credible third party bodies. This assessment system is directed at the market and is therefore simply structured as a check-list to be easily understood by designers and the market in general, and it was planned as a tool to help decision-makers. LEED's importance is reflected by the fact that it is a consensual instrument, approved by 13 different segments of the construction industry, which support the wide dissemination of the system in the USA and Canada. The system awards credits for predetermined criteria compliance. The current draft version of LEED-ND entails 5 categories, 12 prerequisites, 51 possible credits and 110 points. If a project can be certified at one of the four levels, according the points achieved: Certified (40 – 49 points), Silver (50-59 points), Gold (60 to 79 points) or Platinum (up to 80 points). LEED-ND does not apply an explicit weighting to specific categories. Instead, the different numbers of credits and points within each one implicitly define the appropriate weights. Since the structure allows for the evaluation of separate aspects, a project can be classified and certified without the need to take into account aspects combined with others or those controlled by other agents. Therefore, the result of the assessment can be incomplete, possibly not a true reflection of overall project performance.

3.2 AEU

According to the *Association pour la Haute Qualité Environnementale* HQE® (2006), the *Approche Environnementale de l'Urbanisme* (AEU) represents an environmental approach to urbanism. The AEU was developed by the HQE® and presented in the *Demarché de Qualité Environnementale pour les Opérations d'Aménagement* published in January 2006. HQE® (2006) has affirmed that specific guidelines for the AEU will be published at the end of 2006. The AEU consists of a global and across-the-board approach, an operational assessment applicable to the following four key moments of urban project process: Conception, Guidelines and Planning, Urban Project and Operational Phase. In common with many other tools developed by the HQE® for the assessment of isolated buildings, the AEU is a rating and certification system for projects that takes into account local contexts with a view to dealing appropriately with environmental issues. The AEU is also concerned with the economic and social aspects of sustainable development, on the basis that environmental and energy enhancements cannot be implemented if they contravene sustainable socio-economic aspects. This method brings together other two complementary tools also developed by the HQE®: the *Système de Management d'Opération* (SMO), or Operation Management System, and *Orientations DD - Développement Durable*, or Guidelines for Sustainable Development. Conduct of the project is determined by several key events, any or all of which can affect the quality of the final results. The

SMO defines the minimum requirements for each stage in order to ensure project efficiency by controlling the planning, conception, execution and feedback processes, based on aspects such as: commitment, a multidisciplinary team, dialogue and awareness, an Action Plan, assurance of an environmentally balanced project, and others. The eleven specific subjects of *Orientations DD* form the basis for questionnaires, regarded as a vital support tool for developing project action plans. These eleven subjects are outlined in general guidelines which describe the overall and subsequently individual objectives. An Action Plan is needed for each guideline in support of project management, in accordance with the SMO. An important detail is that each questionnaire contains information regarding French legislation on the respective subjects.

3.3 GRI

According to GRI (2006), the Global Reporting Initiative (GRI) Sustainability Report Guidelines system was developed by the Collaborating Centre of the United Nations Environment Program (UNEP). Since publication of the first Guidelines in June 2000 many improvements have been made. The latest version, G3 (the 3rd GRI Guidelines), was published in October 2006. GRI has undertaken this task with the active voluntary participation of corporations, NGOs, accountancy organizations, trade unions, investors, and other stakeholders worldwide. These different constituencies have worked together to build a consensus around a set of reporting guidelines with the aim of achieving worldwide acceptance, and to assist reporting organizations to articulate, compare and understand the contributions of the reporting organizations to sustainable development. The major direct and indirect economic, environmental impacts and social issues of the reporting organization provide the basis for measurement of practical progress toward sustainable development. The scope definition obeys several criteria, but it can be applicable only to a single specific project. The GRI Sustainability Report structure comprises four performance indicator groups: economic, environmental, social and product responsibility. Each group is required to fulfill performance objectives, set out in individual explanatory texts. In this way value is added related over a predetermined period for each specific indicator. All four groups possess 79 indicators to be evaluated, consisting of 49 ‘core’ indicators – of greatest relevance to most reporting organizations and of interest to most stakeholders - or 30 ‘additional’ indicators, which the reporting organization may choose to measure or not.

4. Results

The three environmental assessment methods described above are based on environmentally-responsible strategies and criteria for the evaluation, classification and/or certification of a project. While they do not provide project guidelines, these methods nevertheless can be used as instruments to support projects by encouraging compliance with prescribed concepts and environmental concerns. As an urban land subdivision, the Fazenda Tizo Park project takes into consideration elements from all the environmental assessment methods described. The levels of relative relevance of application are shown in Table 1.

Table 1: Relative relevance of application to the Fazenda Tizo Park

1	Relevant	2	Very Relevant	3	Extremely Relevant
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The sustainability concept advocates a single hierarchic level for the environmental, social and economic components. The three above methods embrace inherent social aspects associated with concepts of urbanism and the AEU – in addition to environmental performance evaluation – incorporates formal action plans which determine the costs for specific levels of environmental performance. The LEED-ND is more restrictive vis-à-vis urbanistic issues and the GRI presents an integrating approach which results in it being more superficial. A comparative summary of the three methods - LEED-ND, AEU and GRI – is presented in Table 2.

Table 2: Comparison between the LEED-ND, AEU and GRI assessment methods

	LEED-ND	AEU	GRI
<i>Developed by</i>	U.S. Green Building Council	Association Haute Qualite Environnementale (HQE)	United Nations Environment Programme (UNEP)
<i>Origin</i>	U.S.A.	France	United Nations
<i>Main Objectives</i>	To establish a common standard of sustainability measurement	To identify and estimate environmental impacts with urban project	To measure and communicate organization's sustainability performance
	To promote the practice of integrated "green projects"	To propose actions to reduce and control these impacts	To promote a reasonable report of performance
<i>Assessment Scope</i>	Environmental	Environmental and Economic	Environmental, Economic and Social
<i>Application</i>	Project check-list; Classification	Management Tool; Action Plans	Report
<i>System Limits</i>	Project and Processes	Project, processes and management	Organization (limited by itself), Products and Services
<i>Assessment Structure</i>	Smart Location and Linkage	Mobility and accessibility	Economic Performance Indicators
	Neighborhood Pattern and Design	Social context and uses; Materials; Energy and climate	Environmental Performance Indicator
	Green Infrastructure and Buildings	Urban form and rational space use; Climate and geography	Product Responsibility Performance Indicators
	Innovation and Design Process	Landscape and biodiversity; Water; Soil; Waste and Refuse	Social Performance Indicators
	Regional Priority Credit	Visual and noise pollution	
<i>System Evaluating</i>	Rating System	Rating System	Rating System
<i>Assessment Moment(s)</i>	Project	Conception; Guidelines and Planning; Urban Project; Operational Phase	Any moment or period (time limit is defined by relating organization)
		Guidelines and Planning	
<i>Results Communication</i>	4 certification levels	Certification	Published self-assessment report
<i>Main Differences</i>	Simple structure	Integrated with two other tools: SMO and DD	More integration of sustainability aspects: economic, social and environmental
	Specifically for urbanistic projects	Specifically for urbanistic projects	For organizations

A map of relative relevance for application to the Fazenda Tizo Park was drawn up (see Table 3) based on detailed analysis of LEED-ND criteria.

Table 3 – Part 1: LEED-ND Points Overview, with relative relevance for the Fazenda Tizo Park

Item	Points	Relevance	Item	Points	Relevance
<i>Smart Location and Linkage</i> 27 possible points			<i>C 9: Access to Civic / Public Spaces</i>	1	3
<i>Prerequisite : Smart Location</i>	Req	3	<i>C 10: Access - Recreation Facilities</i>	1	3
<i>Prereq 2: Imperiled Species and Ecological Communities</i>	Required	3	<i>Credit 11: Visitability and Universal Design</i>	1	3
<i>P 3: Wetland / Water Body Conserv.</i>	Req	3	<i>Credit 12: Community Outreach and Involvement</i>	2	3
<i>P 4: Agricultural Land Conserv.</i>	Req	2	<i>C 13: Local Food Production</i>	1	2
<i>Prereq 5: Floodplain Avoidance</i>	Req	3	<i>Credit 14: Tree-Lined and Shaded Streets</i>	2	3
<i>Credit 1: Preferred Locations</i>	10	3	<i>C 15: Neighborhood Schools</i>	1	2
<i>Cred 2: Brownfield Redevelopment</i>	2	3	<i>Green Infrastructure and Buildings</i> 29 pos. points		
<i>Credit 3: Locations with Reduced Automobile Dependence</i>	7	2	<i>Prereq 1: Certified Green Building</i>	Req	1
<i>Cr 4: Bicycle Network and Storage</i>	1	3	<i>P 2: Minimum. Building Energy Efficiency</i>	Req	1
<i>Cr 5: Housing and Jobs Proximity</i>	3	1	<i>P 3: Min Building Water Efficiency</i>	Req	1
<i>Cr. 6: Steep Slope Protection</i>	1	3	<i>Prereq 4: Construction Activity Pollution Prevention</i>	Req	3
<i>C 7: Site Design for Habitat or Wetland and Water Body Conservation</i>	1	3	<i>Credit 1: Certified Green Buildings</i>	5	1
<i>Credit 8: Restoration of Habitat or Wetlands and Water Bodies</i>	1	3	<i>Cred 2: Building Energy Efficiency</i>	2	1
<i>C 9 Long-Term Conserv. Manag. of Habitat or Wetlands / Water Bodies</i>	1	3	<i>Credit 3: Building Water Efficiency</i>	1	2
<i>Neighborhood Pattern and Design</i> 44 possible points			<i>Cr 4: Water-Efficient Landscaping</i>	1	3
<i>Prereq 1: Walkable Streets</i>	Req	3	<i>Credit 5: Existing Building Reuse</i>	1	2
<i>Prereq 2: Compact Development</i>	Req	1	<i>Credit 6: Historic Resource Preservation and Adaptive Use</i>	1	2
<i>P 3: Connected / Open Community</i>	Req	3	<i>Cr 7: Minimized Site Disturbance in Design and Construction</i>	1	3
<i>Credit 1: Walkable Streets</i>	12	3	<i>Credit 8: Stormwater Management</i>	4	3
<i>Cr. 2: Compact Development</i>	6	1	<i>Credit 9: Heat Island Reduction</i>	1	1
<i>Cr 3: Mixed-Use Neighbor. Centers</i>	4	2	<i>Credit 10: Solar Orientation</i>	1	2
<i>Credit 4: Mixed-Income Diverse Communities</i>	7	2	<i>C 11: On-Site Renewable Energy S.</i>	3	3
<i>Cred 5: Reduced Parking Footprint</i>	1	2	<i>Cr 12: District Heating and Cooling</i>	2	1
<i>Credit 6: Street Network</i>	2	2	<i>C 13: Infrastruct. Energy Efficiency</i>	1	3
<i>Credit 7: Transit Facilities</i>	1	3	<i>Credit 14: Wastewater Management</i>	2	3
<i>C 8: Transp. Demand Management</i>	2	3			

Table 4 – Part 2: LEED-ND Points Overview, with relative relevance for the Fazenda Tizo Park

Item	Points	Relevance	Item	Points	Relevance
C 15: Recycled Content in Infrastr.	1	2	Innovation and Design Process	6 possible points	
C 16: Solid Waste Manag. Infrastr.	1	3	C 1: Innovation and Exemplary Performance	1–5	1
Cr 17: Light Pollution Reduction	1	2	C 2: LEED Accredited Professional	1	1
Regional Priority Credit	4 possible points				
Credit 1: Regional Priority	1–4	1			

The eleven subjects and general guidelines of *Orientations Développement Durable (DD)*, together with the relative relevance map for application to the Fazenda Tizo Park can be seen at Table 4.

Table 5: General guidelines of AEU, with relative relevance for the Fazenda Tizo Park

General guidelines for Sustainable Development	Relevance	General guidelines for Sustainable Development	Relevance
Subject 1: Urban form and rational space use		Location taking account local characteristics	2
To take account of the specific urban context	3	To optimize enjoyment of public spaces	3
Integrated urban composition with environmental quality objectives	3	Subject 7: Landscape and biodiversity	
Space economy	1	To preserve ecosystems	2
Subject 2: Social context and uses		To improve the landscape	2
To promote social cohesion	2	To create landscape quality	2
To take account of existing uses	1	Subject 8: Visual and sonorous pollution	
Interface quality between public / private space	2	To reduce sources of pollution	1
Accessibility to all urban services	1	To apply preventive and control actions	2
Subject 3: Mobility and accessibility		Subject 9: Waste and rejects	
To reduce gas emission	1	To reduce sources of waste and refuse	2
To take account mobility str. of urban context	1	To apply existing policies	2
Subject 4: Water		Natural resources preservation	2
To prevent flooding	1	Water bodies protection from stormwater	2
To reduce consumption	2	Subject 10: Soil	
To preserve water resource	3	To tailor project to local situation	2
Subject 5: Energy and climate		Project design to reduce env. imp. excavation	2
To integrate energy altern. into a more overarching env. and socioeconomic discussion	3	Soil preservation quality	2
To reduce gas emission	1	Subject 11: Materials	
To reduce consumption	2	Conservation of resources	1
Subject 6: Climate and geography		To reduce gas emissions at manufacturing	1
		Transport reduction	1
		Health preservation	2

Each indicator relating to the four groups of the GRI Sustainability Report Guidelines was analyzed with relative relevance for application to the Fazenda Tizo Park (see Table 5).

Table 5: Performance indicators of the GRI, with relative relevance for the Tizo Park

<i>Description</i>	<i>Relevance</i>	<i>Description</i>	<i>Relevance</i>
<i>EC Economic Performance Indicators</i>		<i>Social Performance Indicators</i>	
<i>Economic Performance</i>	<i>1</i>	<i>LA Labor Practices and Decent Work</i>	
<i>Market Presence</i>	<i>1</i>	<i>Employment</i>	<i>1</i>
<i>Indirect Economic Impacts</i>	<i>2</i>	<i>Labor / Management Relations</i>	<i>1</i>
<i>EM Environmental Performance Indicators</i>		<i>Occupational Health and Safety</i>	<i>2</i>
<i>Materials</i>	<i>2</i>	<i>Training and Education</i>	<i>2</i>
<i>Energy</i>	<i>2</i>	<i>Diversity and Equal Opportunity</i>	<i>2</i>
<i>Water</i>	<i>3</i>	<i>HR Human Rights</i>	
<i>Biodiversity</i>	<i>3</i>	<i>Investment and Procurement</i>	<i>2</i>
<i>Emissions, Effluents, and Waste</i>	<i>2</i>	<i>Non-Discrimination</i>	<i>1</i>
<i>Products and Services</i>	<i>2</i>	<i>Freedom of Association</i>	<i>1</i>
<i>Compliance</i>	<i>2</i>	<i>Child Labor</i>	<i>1</i>
<i>Transport</i>	<i>2</i>	<i>Forced And Compulsory Labor</i>	<i>1</i>
<i>Overall</i>	<i>2</i>	<i>Security Practices</i>	<i>2</i>
<i>PR Product Responsibility Performance Indicators</i>		<i>Indigenous Rights</i>	<i>1</i>
<i>Customer Health and Safety</i>	<i>3</i>	<i>SO Society</i>	
<i>Product and Service Labeling</i>	<i>2</i>	<i>Community</i>	<i>3</i>
<i>Marketing Communications</i>	<i>2</i>	<i>Corruption</i>	<i>1</i>
<i>Customer Privacy</i>	<i>2</i>	<i>Public Policy</i>	<i>1</i>
<i>Compliance</i>	<i>2</i>	<i>Anti-Competitive Behavior</i>	<i>1</i>

Table 6 is a summary of the points covered by the three environmental assessment methods analyzed. It takes into account the relative relevance for application to the Fazenda Tizo Park, as presented in the three preceding tables.

Table 6: Relative relevance for the Fazenda Tizo Park on the basis of the LEED-ND, AEU and GRI environmental assessment methods

		LEED-ND	AEU	GRI	TOTAL
1	Relevant	31	11	22	64
2	Very Relevant	31	17	46	94
3	Extremely Relevant	7	5	11	23
TOTAL		69	33	79	181

5. Conclusions

This research was able to identify how selected environmental assessment methods deal with the urban sustainability aspects of land subdivision project evaluation. The research also examined the advantages and disadvantages of the various methods.

The aforementioned environmental assessment methods differ in their approach to market expectations and building practices, effectively mirroring the different environmental agendas of each country of origin. Environmental issues such as global warming, ozone layer damage, acid rain, forest degradation etc are acknowledged as global problems and are reflected, in one way or another, in the three assessment methods, while the weight attributed to other issues varies according to geographic circumstances and different ways of describing the methods employed. For example, buildings energy efficiency is strongly represented in the LEED, while the AEU places greater emphasis on global energy alternatives and the GRI displays a more inclusive approach to sustainability by targeting economic, environmental and social aspects.

From the urbanistic viewpoint, the assessment methods on the whole reflect a shared group of concepts: preservation of open spaces, compact development, concern with occupation density and proximity to traffic flows, mixed usage, pedestrian and cyclist-friendly projects, street connectivity, heritage preservation, green space accessibility, varied and economically affordable housing etc.

The Fazenda Tizo Park urbanistic project can make good use of different aspects of the three assessment methods, particularly those relating to the environment. Given the existence of a number of water bodies and wetlands in the park area (see Figure 018.3 - section 2 above), one of the criteria considered “extremely excellent” in the LEED-ND guideline (“Prerequisite: Wetland & Water Body Protection) was used. The LEED-ND for example recommends a building distance of 100 feet from water bodies and wetlands, unlike the 30 meters prescribed by Brazilian Federal Law No. 4771/65 for water bodies and by the CONAMA resolution on urban lakes. It can be seen that LEED-ND is more conservative in this respect than Brazilian legislation.

Employing this approach, all the three assessment methods (LEED-ND, AEU and GRI) and the environmental concerns enshrined therein are reflected in the Fazenda Tizo Park urbanistic project. It is worth noting however that all three methods fail to adequately balance different criteria and to fully integrate other aspects of the projects. Nevertheless the various methods are useful tools for securing

ongoing improvements in urban sustainability, in line with the principles of the Global and Local Agenda 21 and Habitat II.

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