Components of Sustainable Design in Special Ecological Areas

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ABSTRACT

This research examines the components of sustainable design. Sustainable design is highly important in ecological areas and should guarantee the improvement of residents' quality of life and environmental protection by considering the unique environmental factors of each region. This study delves into the concept of sustainable design, the factors influencing it, and the implementation methods for creating sustainable designs in different ecological areas. The aim of this study is to present a coherent theoretical framework to deepen the concept of sustainable design and provide an explanation for its components in the environment of a protected area. This study investigates the physical changes in protected areas and the improvement activities created so that minimal damages are inflicted on the local environment. Achieving a sustainable framework will help protect these areas and the environment in general. To reach this goal, ideas for sustainable development have been studied. This examination may assist environmental engineers and urban designers in identifying better methods for sustainable design in these areas and ensuring environmental improvement and residents' quality of life.

Introduction

Currently, due to climate change, depletion of natural resources, and population growth, the need for sustainable design in ecological areas has become more important than ever. Sustainable design involves creating living environments that simultaneously meet human, economic, and social needs while protecting natural resources and contributing to the sustainable development of the region.Due to rapid urbanization, more than 50% of the world's population now live in cities, and by the year 2050 the figure will increase to 69% of the global population [1] as shown in Figure 1. Existing cities are responsible for the depletion of natural resources and agricultural lands, as well as contributes to more than 70% of global CO_2 emissions (FAO 2011). Cities of all sizes are drivers of economic growth for their respective regions and countries. They continue to influence the demand for natural resources and energy derived from fossil fuels. The intrinsic inertia in global energy infrastructures implies that the dependency on fossil fuels is set to rise in the short term, before the policies for phase-out start to have a real impact. The majority of the increase in energy demand is estimated to come from the emerging economies, particularly India, China and the Middle East (IEA 2013), coinciding with increasing in urbanization rate and population density in developing countries. Figure 2 illustrates the trend in urbanization in developing countries, projected to rise from 46% in 2010 to 63% in 2050, with corresponding increases in population density, which is expected to double over the next three decades (Huang 2010) as shown in Figure 3. Urbanization and population density are suggested as the key determinants that will shape the future of 21st century cities [2]. There is, therefore, an urgent need to find effective solutions for new and existing urban areas to mitigate the impacts of climate change, and to achieve a balance between various dimensions of sustainability [3].
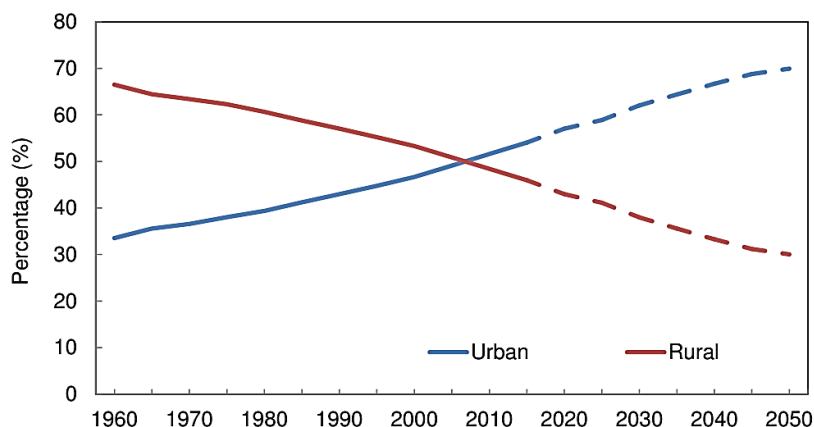

Figure 1: Historical and projected urban and rural population percentage of the world 1960-2050. Data source: (Worldbank 2014).
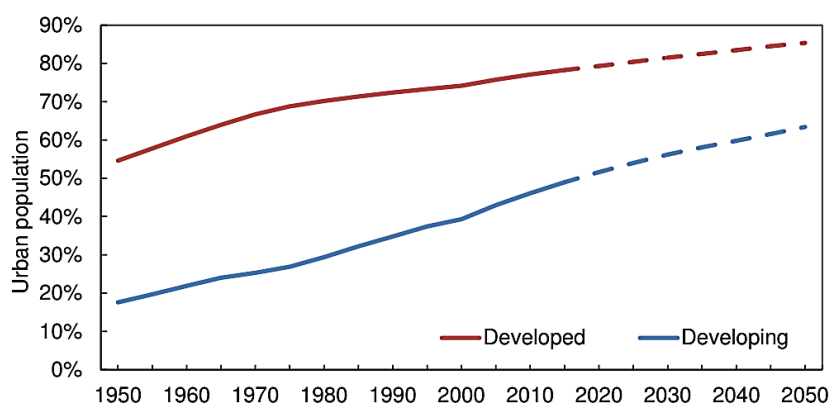
Figure 2: Historical and projected rate of urbanization in developed and developing countries. Data source: (UN 2014).
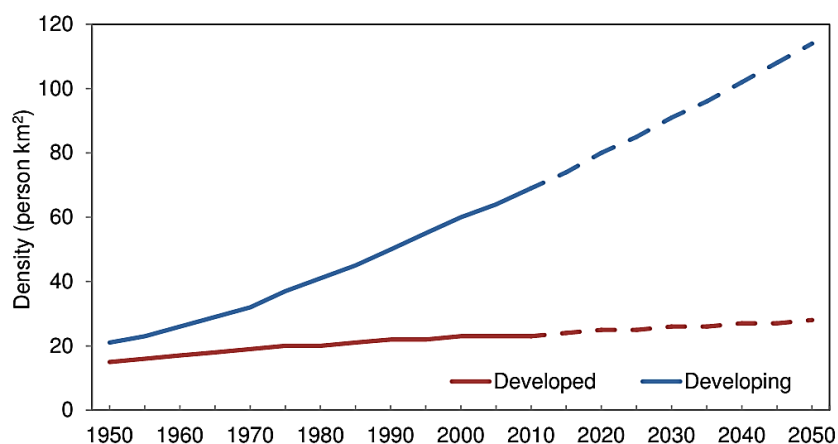

Figure 3: Historical and projected population density in developed and developing countries 1950- 2050. Data source: (UN 2014).

The impact of built cultural heritage on the social wellbeing of different population groups living within increasingly cosmopolitan towns and cities has also been recognised as an important dimension of sustainability [4], bringing the constituent dimensions to four: environmental, economic, social and cultural.

In this regard, various factors such as conservation of natural resources, interaction with the environment, utilization of sustainable energy resources, sustainable development, and social participation should be considered in sustainable design. The concept of sustainability gained attention worldwide from the late 1970s, stemming from new environmental awareness. It was significantly addressed in 1992 at the United Nations Conference in Rio de Janeiro, Brazil, known as the Earth Summit, where the topic of sustainable design and development was discussed and approved. The most commonly used definition is that of the Brundtland Commission: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Other definitions have also been proposed, but it may be best to adhere to the following definition: "Sustainable design is a design that improves human health and ecological systems in the long term." [5] Given these factors, sustainable design in ecological areas can ensure the improvement of residents' quality of life and environmental protection.

2. Sustainable design

There are other important factors that we need to consider and study, including economic, social, physical, and human aspects. To achieve maximum protection levels, consider developing in a specific ecological region. Residents need to have a basic understanding of the region [6]. To do this, we need to study our behavior and knowledge regarding the protected area. You can ensure the safety and development of special ecological regions by ensuring that residents are fully aware of its importance and how to address it, and the percentage of progress that will be made. This will lead to ensuring maximum sustainable recommendations. This will be reflected in the economic, financial, and physical aspects of the region [7]. Therefore, recommendations for living in a specific protected area can include the following:

- A detailed understanding of the problems of a protected area is essential as these issues hinder community development.

- Changes made in the protected area such as buildings, trees, facilities, and leading industries are formal elements that preserve the space.

- Natural, cultural, economic, and social structures (especially the geographical environment) have specific skeletal structures and internal organization that impact housing and the "native landscape".

- The negative outlook of a protected area, in terms of its functionality, and its relationship with human needs, activities, production elements, and the environment, forms a set equal to a specific nature that represents the connections, functions, and a multi-functional role in various aspects.

- In addition to rapid technological advances, advanced systems can be enhanced by protecting the native landscape and its unique aesthetic qualities in order to promote valuable culture in protected areas and increase modernization and cultural foundations.

- In addition to protecting quality, diversity, and different ecosystems, sustainable tourism aims to enhance the social level of individuals living in a protected area and seek to create a balance between them and tourism locally. Thirty years ago, many countries began to focus on protecting natural and human environments and accessible diversity.

- These efforts fall under sustainable development laws that create protection and development, and new options in sustainable tourism, such as "sustainable ecotourism," have been categorized.

2-1- Selection of sustainability assessment tools
These six tools are selected for review primarily because of their global recognition anddevelopment from individual buildings to neighborhood and city buildings, andthe public availability of technical documents and guidance, which is a proxy. maturity levelthese tools have reached. The selected tools have also been widely adopted in their own jurisdictions and in different contexts. There is a lot of information about their usability, suitability andflexibility. Research projects that do not have an organizational presence in the fieldhave been excluded because they may not be limited by practical implementation problems thatcould affect the results. Voluntary international initiatives involving sustainability assessments of a wide geographical area (eg regions, countries or continents) have been removed,because they rarely deal with physical building forms [8]. In addition, the selected tools have been a positiveforce to push the boundaries of market recognition of sustainability through assessment andassurance. Because of their potential for influence, it is imperative that these tools be critiqued.

2-2- BREEAM Communities and local authorities
Local authorities play a key role in delivering sustainable communities through planning policy and development management. In some cases they may also be leading the masterplanning process [9]. This method can be initiated by local authorities through planning policy or on council led development projects. Bristol City Council requires a BREEAM Communities assessment on all 'super major' developments through planning policy (Core Strategy, adopted June 2011). "We wanted to make use of nationally recognised standards in line with the National Planning Policy Framework," says Celia Beeson of Bristol City Council. "Our own checklist made it difficult for case officers to be clear on what the development was actually going to do. The national standards ensure that the development has undergone a credible and transparent process to assess sustainability." In Belgium, the city of Antwerp and the Flemish region are developing Blue Gate Antwerp - a brownfield site in the south of the city centre - into an eco-effective business park. They are proposing that the potential private partners develop the site according to BREEAM Communities [10].

Figure 4: All You Need to Know about BREEAM

BREEAM Communities is an assessment method that helps professionals design places that people want to live and work in, are good for the environment and are economically successful. BREEAM Communities 2012 is available for use anywhere in the world through a simple 'bespoke' assessment process. There are currently developments in Sweden, Norway, Belgium and Turkey undergoing this process, with others expected to follow [11]. Bespoke criteria tailor the technical manual so that key issues and challenges in the country/region are fully recognised, including: location and current use of the development site, local climatic conditions (including microclimate and potential impacts from climate change),land use pressures, local and national planning policies, cultural, economic, social and environmental differences that are relevant to masterplanning.

Figure 5: BREEAM Communities gives equal importance to the social, economic and environmental dimensions of sustainability

2-3- LEED– ND
In the year 1993, USGBC (United State Green Building Council) designed the first version of LEED, in order to transform the market for green buildings and then expanded quickly to urban development assessment. In 2007, the pilot version was launched and developed to include neighbourhood development (ND) in 2009-2010. It represented the specific version for assessing sustainability of urban design [12].

2-3-1- CASBEE- UD (for urban development)
The Japanese Sustainable Building Consortium (JSBC) is the developer of the environmental assessment tool for CASBEE as an environmental performance of buildings, after its appearance in 2001 as a sustainable assessment tool for office buildings. CASBEE-- UD was launched in 2007 as a joint product between the Japan Sustainable Building Consortium and the Japan Green Building to cover urban development (town and city development) [13]. Several generations

were represented in CASBEE, e.g. CASBEE new construction, CASBEE existing buildings, CASBEE renovation projects, and urban development that deals with entire cities, building components and clusters, multiple functions, in addition to urban spaces and ancillary spaces. It was designed for external spaces only instead of inside buildings [14].

2-3-2- SBToolPT – UP (for urban development)

SBTool emerged in 1996 under the name GBTool, as an assessment method for individual and green buildings established by the International Initiative for a Sustainable Built Environment (iiSBE) in 2005, and the name became SBTool [15]. Stool PT is one of the important products of SBTool specifically to assess the building sector in Portugal and started as a building assessment tool to develop local design methods and construction methodologies. The sustainability assessment of building is more important than evaluating the groups of buildings. Hence, the scope was expanded in the development and the assessment scale of sustainability toward sustainability of urban planning and design. SBToolPT- UP (The Portuguese sustainability assessment method) appeared as the latest method in the sustainability assessment of cities [16]. The technical manual of SBToolPT- UP or the user guide is not issued yet.

3. Sustainable Ecotourism

Sustainable ecotourism, as an anthropological environmental science, is sustainable [17], in that it can provide a response to the current needs (social, political, economic, and cultural) of ecologies. Instead of destruction, it contributes to protecting and enhancing opportunities for future livelihoods (environmental sustainability). Sadler is one of the pioneers who discussed the ecotourism model in 1990. It encompasses social, economic, and environmental objectives that include providing social benefits, education, and jobs for locals. Economic objectives include economic benefits for the local host community and economic sustainability, while environmental objectives include helping to protect the native landscape as it is the key element that shapes the structures of protected areas and reflects the economic quality, geography, climate impact, and cultural quality, traditions, and activities of the people. Attention to both fundamental types is inherent in the essence of the native landscape. The first involves connection to the cultural environment by considering all its values and laws; the second involves connection to the environment by considering the data provided to humans by nature [18]. Ecotourism is a tool for natural resource conservation. The economic use of natural landscapes and providing sufficient funding to protect them is feasible as a result of the increase and development of ecotourism [19]. Suitable areas for ecotourism are vast but often unrecorded and at risk of destruction. Geographic reviews and feasibility studies in the field of anthropological environmental science indicate that ecotourism is an underexplored, valuable social, and economic resource worthy of investigation.

Ecotourism is one of the most promising methods for protected areas to generate tangible and sustainable benefits from nature-based tourism. It can provide meaningful motivation and economic justification for conservation, as it relies on maintaining untouched nature and vibrant communities of wildlife and plants. Additionally, it can create savvy and influential customers who can serve as advocates for conservation in protected areas. However, if nature-based tourism is not carefully managed, it may lead to a significant decline in the resources it depends on and occurs in the region [19]. According to the World Tourism Organization (WTO), one of the five main trends in tourism will be significant growth in adventure tourism and ecotourism. The WTO predicts a steady growth in cultural tourism. The Middle East and North Africa region (MENA) are among the places where such a decline is expected in the near future. Therefore, it is vital that tourism ensures that such progress and activities are based on natural and cultural values that are secured primarily for protected areas, with careful planning. This can only be ensured through effective management of these areas. Strong collaborations between protected area institutions and tourism entities, including commercial operators, must be emphasized [20].

Table 1: Goals of Sustainable Design with Main Topic (Individual-Centered Approach)

Goals	Items
Practical (Form + Activity)	- Establishing specific formal facilities in the oasis for residents and tourists - Planning, regulating, and reviewing formal patterns of the oasis reserving space, formal diversity, and accessible hierarchy in oasis architecture - Preserving functional diversity and their related uses - Orienting people and meeting their needs - Establishing connections between old and new forms - Updating all lost forms and activities - Considering natural and native landscape morphology
nvironmental, Aesthetic (Activity + Perspectives)	- Improving the quality of the host community - Maintaining social cohesion and cultural integration among oasis residents - Preserving coherence and emphasizing the identity of the oasis structure - Preserving cultural and social values of oasis life - Preserving and focusing on the native landscape and natural environment - Emphasizing natural forms based on visual items - Protecting, renovating, and preserving historical landmarks - Protecting the oasis structure
nvironmental (Form + Ecology)	- Preserving local capabilities and environmental qualities - Observing appropriate use of natural and environmental resources ocusing on natural, environmental, and native landscape with consideration of environmental anthropology - Reducing pollution - Balancing ecologies

The strategies mentioned in the research topic may not necessarily have the required universality (globality), but categorizing them will be effective in establishing a specific base. The use of a combined strategy integrates all these strategies into a systematic framework and allows for maintaining the independence of each domain, as well as studying the relationships among them. Since each strategy has its own strengths and weaknesses; however, combined strategies leverage each other's advantages while addressing their weaknesses [21].

Therefore, different aspects of two or more strategies (1 - practical (form + activity), 2 - experimental-aesthetic-cognitive (activity + perspectives), 3 - environmental-biological (form + ecology)) have been discussed to achieve sustainable design strategies in a specific protected area. A specific solution for creating coherence between two strategies (practical (form + activity), experimental-aesthetic-cognitive (activity + perspectives) is introduced and will be elaborated in Table 2.

Table 2: Strategies for Pursuing the Subject Based on the Main Items of Sustainable Design

Strategies	Items
Practical (Form + Activity)	- Integration of various applications - Utilizing practical design - Permeability of activities - Review and supervision of tasks by oasis residents - Harmony of form and function - Space flexibility - Preservation of activity sequences - Distinguishing and meeting community needs - Optimizing density and land use - Providing safety for various activities - Building communities
Environmental-Aesthetic (Activity + Perspectives)	- High-quality activities and accessible spaces - Supporting social well-being - Differentiating between artificial and natural organic forms - Customizing options - Enhancing visual attractiveness of local oasis landscapes - Natural and cultural heritage

Environmental (Form + Ecology)	- Organizing and meeting social points (specific and public places in the oasis) - Improving the quality of public and private spaces in different seasons - Mental role of oasis spaces - Cultural meanings in local oasis landscapes (cultural landscape) - Considering indigenous relationships in the region (environmental anthropology) and maintaining their balance - Considering resource efficiency in energy sustainability - Minimizing environmental pollution - Providing comfort for residents - Organizing designs compatible with nature and local landscapes - Creating designs compatible with water and climate

4. Conclusion

In this study, the effective relationship between good design based on environmental anthropology principles and the standard of living has been emphasized in a way that, by implementing oasis programs, improving the physical quality of the environment leads to an increase in people's standard of living. The natural vista is not only considered as a formal component. Additionally, the creation of artificial spaces without attraction was not neglected. The subject of appropriate design and the creation of dynamic spaces in the oasis according to social, cultural, economic, and formal-environmental elements have been the strategic goals to increase the standards of the regions in the oasis. Meanwhile, sustainable tourism emerges from the necessity to reduce the side effects of tourism. Therefore, a strategy to protect natural capacities and local ecosystems in special areas, in addition to the social-economic form of the oasis, will attract tourists, contribute to economic and cultural development, and create opportunities for oasis residents. This oasis should be developed in a way that its structure formation and evolution will occur during a continuous development process. Gradual historical development is considered based on accepted patterns and laws of sustainable development, leading to a systematic environment. It should be noted that forms of environmental anthropology shape current spaces and have an impact on cultural and social elements. There is no difference between form and function in an oasis environment because the configuration is the result of what you need in the oasis environment; the meaning of visualizing these spaces is influenced by social and cultural forces. Therefore, sustainable design in environmental areas is crucial in preserving natural resources, reducing negative effects on the environment, and improving the quality of life of residents. Given the current environmental challenges, implementing sustainable designs and adapting to the environment, economy, and society is very essential. These actions can contribute to sustainable development and the preservation of natural resources and in a way help balance human needs with environmental protection.

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