

# Sustainable Development for Urban Prosperity in Harmony Between Nature and Architecture

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*Received May 2, 2022; revised and accepted June 7, 2022*

**Abstract:** The relationship between nature and architecture is ancient and has differed in different architectural schools or urban cultures in order to achieve urban prosperity. Analysis of the concept of relationship comes through two main concepts: harmony and contradiction developed with the development of the concept of sustainable urban development. This overlap generated new trends in the field of urban design and environmental design together. Hence, the research aims to develop relationships at times in harmony and at times in contradiction according to a range of positive impacts on nature and the environment built on both negativity on the natural environment first, then on human beings secondly, then it examined the effect of one on the other, which appears outwardly, sometimes in harmony and sometimes in opposition, and combines them under the concept of inclusiveness in achieving goals of urban sustainability.

**Key words:** Sustainable, green, design, nature, architecture.

## Introduction

The harmony and integration of nature have helped maintain its continuity and balance since a long time ago, but human intervention in the exploitation of its resources disrupted this balance, as pollution entered in all its forms from industrial uses and solid waste, development of urban life and expansion of human ambitions to exploit resources. All this led to the exacerbation of environmental problems such as air, water and soil pollution and its impact on the environment, health and human well-being, which requires a balanced exploitation of nature and its resources. All appeals are called to control principles of sustainability, whose difficulty lies in activating harmony and contrast between them.

The research is based on the philosophy of sustainable design, and it is a philosophy that pertains to material

objects and the built environment in relation to economic, environmental and social sustainability linked to its cultural and spiritual values. This results in a sustainable (green) design that is environmentally friendly in all its forms. Therefore, research aspires to a special relationship with nature to meet dimensions of sustainability which aims to reach design values that seek to pay attention to human psychological and physical health on one hand, and performance inside building on the other hand, and to adopt another design concept that represents design of “beyond green design” or “Biophilic.”

## Reinvented Relationship

Sustainable development has become an urgent need because of social awareness of what results from urban pollution, as it must be activated through laws

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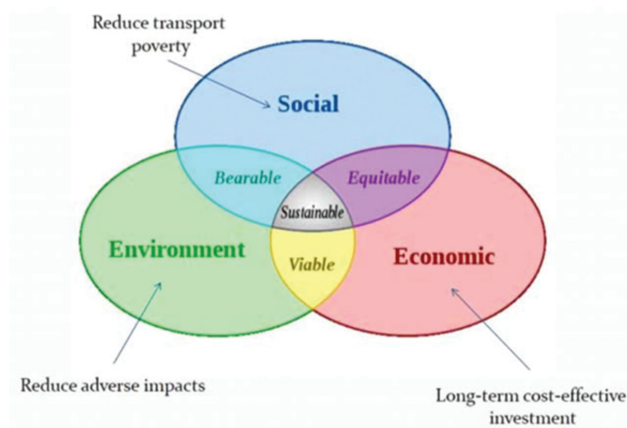
that integrate sustainability solutions into design that gives general perception of built environment. Professionals in architecture and urban planning are at the same time encouraged to use principles of design that are economically and institutionally sustainable. Consequently, new building systems such as low carbon systems, alternative energy, water management systems, decontamination and land reuse processes, and improved social structure investments that have led to the introduction of urban farming products and green buildings, are thus becoming more environmentally friendly.

As a result of this trend, more sustainable technologies are being used in the built environment, open spaces, and building and interior designs. My (environment and human) orientation is reflected in today's space configuration — between buildings, their surroundings and within them — indicating future paths in ways in which green and urban architecture are designed and space is organised in the built environment (Haupt, 2014).

### Pillars of Sustainability

Sustainability includes multiple, decisive and interactive dimensions that overlap with each other, namely dimensions (economic, social and environmental) (Doris and Lorek, 2011), where we cannot achieve environmental, social or economic sustainability separately, but we must consider three dimensions simultaneously to improve quality of environment and prosperity while achieving social equity and sustainable society (McDonald, 2009).

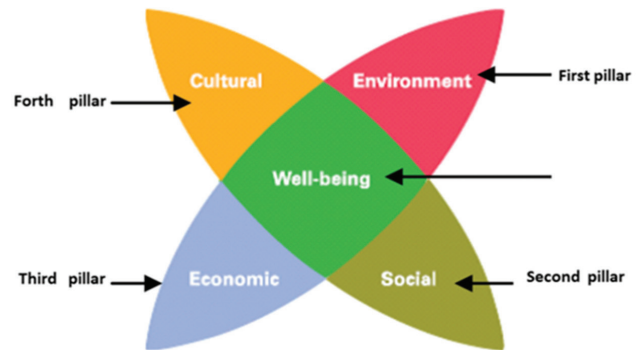
These three dimensions, basic pillars of sustainability, are as follows: Healthy Environment, Economic growth and Social justice (Figure 1).



**Figure 1: Main pillars of sustainable development.**  
Source: Doris and Lorek (2011).

### Fourth Pillar

“Fourth Pillar of Sustainability” by Hawkes indicates that aesthetic cultural characteristics are the basis for the fourth pillar, or missing dimension of sustainability idea, showing that culture is crucial in general planning. A whole set of spiritual, material, intellectual, and emotional attributes constitute a community or social group, as stated in the 1982 Mexico City Declaration on Cultural Policies (Huseynov, 2005; Reed, 2006). Figure 2 shows all pillars.



**Figure 2: Shows three pillars and fourth pillar of sustainable development.** Source: Al-Alwan (2017).

### Nature: Back to Utility

To achieve sustainability, a new approach to building and nature is necessary, because aspects of nature, rooted in its previous aesthetic qualities, are now essential and vital components in the production of clean energy sources, water conservation, and improved air quality can be created without sacrificing their aesthetic importance. As a result, the search for a new character that interacts between architecture and nature from an engineering point of view began. It is more appropriate to think of it as a component of a larger whole rather than as a standalone entity, it returned to its Venetian origins by being considered as a “network of relationships between man and nature.”

Modernist design was “attempting to recreate nature from an aesthetic standpoint — such as a landscape — while transforming the house into a “residential machine,” according to Natura (2002).

### Architecture and Nature

Looking at the shape of city, the first association with it will be the creation of landscapes of structures and buildings of different uses, sizes and shapes, and the organisation of green infrastructure. This vision can be overturned by sustainable design, where buildings are concealed by green roofs, buried in the ground for

more effective insulation, and incorporated into existing landscapes to create new terrain. For example, London Grassroots Community Center is a good example (Figure 3). It includes a sustainable urban context. “A city is much more than its physical structures. Alternatively, it can be thought of as a set of systems. Interactions between people as they live, work or play are captured in architectural forms” (Vale & Vale, 1991). Persons with special needs can humanely access the entire building.

Topography is feature of sustainable architecture using landscape components. (Leśnikowski, W., 1997).

Usually, several properties, such as massive balcony gardens and green roofs, serve as prototypes for more modern designs, such as apartment buildings and multifamily workplaces (Figure 4). In this case, the concept of sustainability was introduced into the design process not only in a technological sense but also in terms of lifestyle and psychological aspects.

A building’s technological advantages, as well as green roofs that serve as environmental insulation and are sculpted like hills to give natural illumination for all office spaces, are all available at the same time. Also



**Figure 3: Eger Architects, London, 2005, Grassroots Community Center. Source: Haupt (2014).**



**Figure 4: A model for most modern designs. Source: Housing in Vienna (2008).**

included are numerous excellent patio views over a green sloping roof that serves as an entertainment space (Delugan and Meissl, 2013).

It is a new idea of quality in a crowded city scene: a green area that provides residents with access to nature, one of the newest attributes of sustainability. Copenhagen’s mountain houses have emerged as another example of a way to build similar environments (Figure 5).



**Figure 5: Style of building on mountains in a gradient manner. Source: Mountain (2013).**

This is a way, to maximize solar gain in order to reduce the demand for heating energy and the need for electric lighting. Check it for multi-storey to avoid the shadow. To provide a living space and garden for the unit, green roof space is also intended to collect reusable rainwater for use in the building’s gardens and general housekeeping. In order to encourage residents to take advantage of a nearby recreational area along canal (Red Mountain, 2013).

### Human Scale

The importance lies in the combination of nature, man and construction, whose movement and work are constantly evolving according to developmental psychology (Visions of Future, “Architecture for 21st Century, red”. M. Serrats, Barcelona, 2011).

### Common Transition Space

Contact with nature is an unavoidable part of every healthy human-based environment, according to research on the subject (Schneider-Skalska, 2004). By reforming the interaction between man and nature, architecture attempts to produce a living environment suitable for work, leisure and learning, as well as modernising the way people interact with the world around them in



terms of aesthetics and social connections. “This type of sensitivity has developed a culture that de-emphasises physical boundaries between dwelling and surrounding environment and instead creates spiritual boundaries (Tadao, 1991). Concept encourages inhabitants to engage in commercial, residential, educational, and recreational public places. Above and below ground, exterior and interior areas are interconnected and dynamic (Linked Hybrid).

### Green Design

The concept of green building is called absolutely green products, services, transportation, and buildings within a specific standard mediated by LEED (Figure 6), while others seek factor of green concept to integrate aesthetic values with environment (Pounder, 2008; Molthrop, 2011). According to US Environmental Protection Agency (EPA), “Green Building” refers to the construction, operation, maintenance/renovation, refurbishing, and demolition of buildings that are ecologically responsible and efficient in their use of resources (Sokoloff, 1990). Green design goals complement and expand interests of traditional design principles in building, such as those embodied by economy, utility, durability and joy (Hui, 2002; Vale & Vale, 1990).

Green architecture or green design is an approach to building that minimises harmful effects on human



**Figure 6: Process of LEED system and its inputs**  
Source: Roy (2000).

health and environment (Thomas, 2009). Any design and construction practices that significantly reduce or eliminate negative impact of buildings on the environment and their occupants in five main areas. (Schneider-Skalska, 2004).

### Architects and “Green Buildings”

- **Ken Yeang:** Green Architecture should provide present needs.
- **William Reed:** Green buildings are just designed in a way that focuses on environmental factors.

- **Stanley Abercrombie:** There is an effective relationship between building and site.

### Principles of Green Building Design

Green design process begins with a deep understanding of the site in all its beauty and intricacies. It is based on an ecological approach to design and aims to integrate systems offered with on-site ecological functions shaped by Mother Nature. These environmental functions provide housing, response to the movement of the sun, air filtration, collecting, filtering and storing capture. Designers can create features in their buildings that mimic the functions of specific ecosystems. Creating new habitats on structures in urban areas is especially important to support biodiversity and a healthy ecosystem (Principles of Green Building Design (Roy, 2000)).

### Design Considerations

Successful planning is one that limits environmental imbalance on-site by wastewater management. Rainwater management, landscape and exterior design to reduce heat islands, reduce light pollution. Reducing dependence on the car by saving space occupied by parking lots (Figure 7).

### Green Building Materials

It is necessary to know and determine source of building materials before selecting them, how they are obtained, what are their components, and whether they are used, reused or renewed. Also, its performance must be known within its construction life span and its depreciation period, as is the case with green building elements (Roy, 2000).

### Sustainable Design Trends

First, sustainable design proposals that seek to reduce the negative impact on the environment: Its aim is to reduce and mitigate various negative impacts of the modern urban environment on the environment which can be achieved through “design that seeks to reduce the negative impact on the environment” (Kellert et al., 2008).

Second, sustainable design propositions seek to reduce the passive effect on humans. After proposals of sustainable design went towards preserving energy and resources—as a reaction to energy disasters—employing the most economical materials and fastest technologies while paying attention to provisions of building to reduce the energy used; many problems related to human health and well-being emerged on the

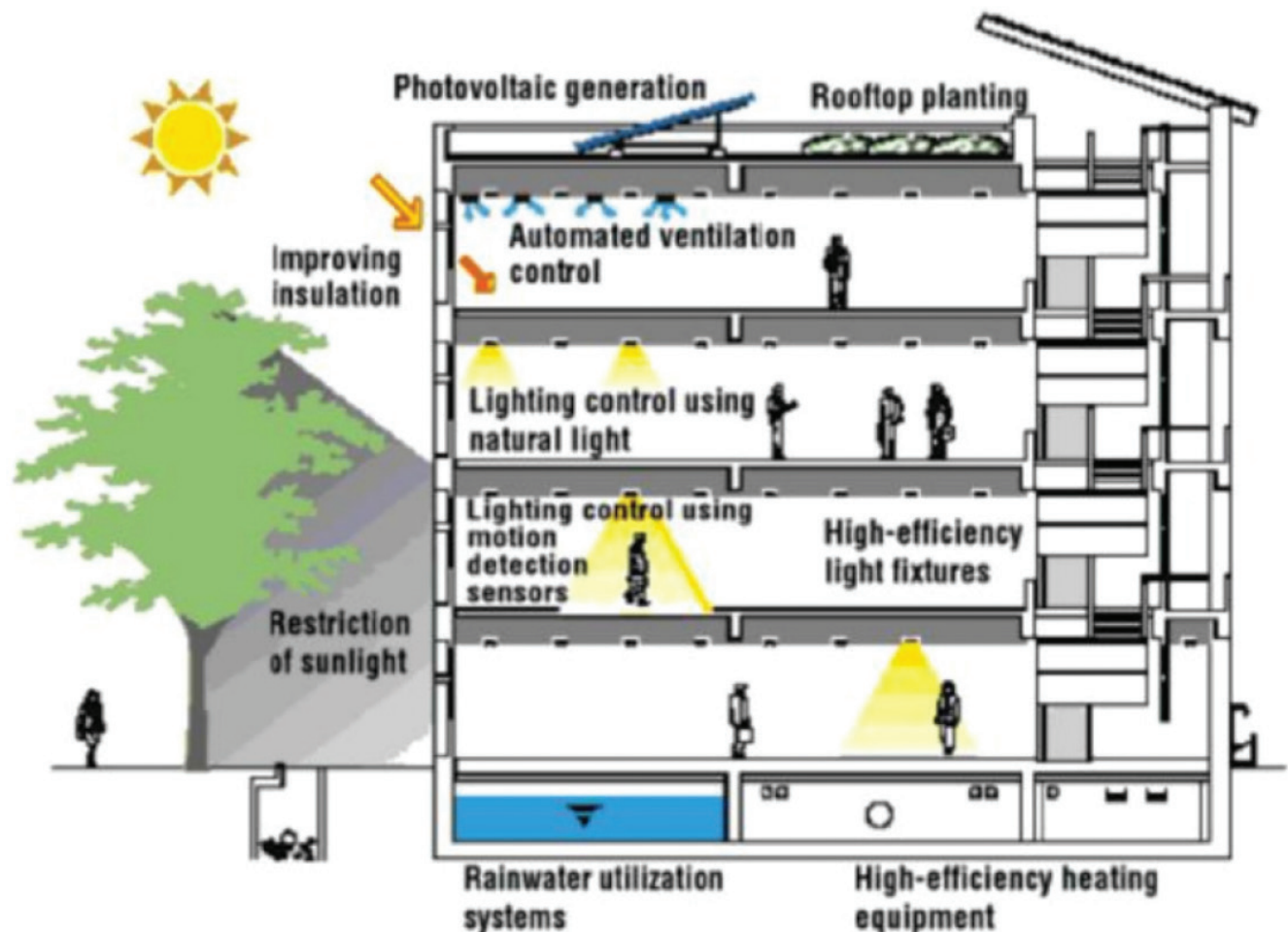


Figure 7: Conceptual drawing of green building (Roy, 2000).

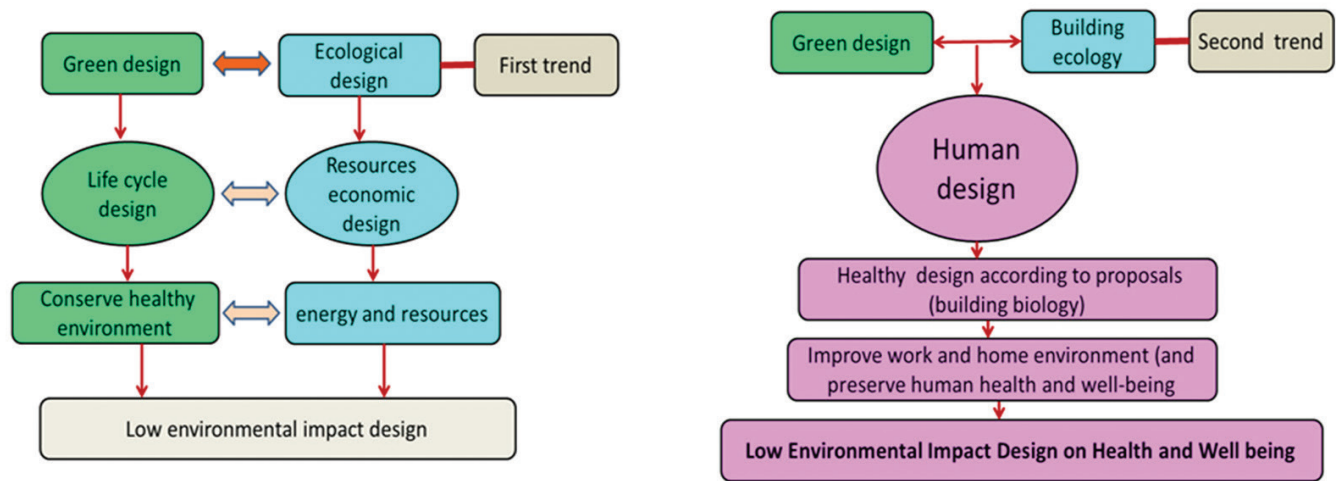


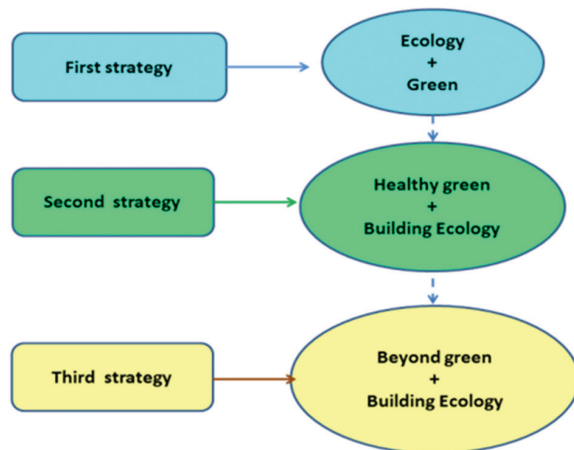
Figure 8: Trends of classification of sustainable design (Al-Alwan, 2017).

scene, including poor air quality and lack of percentage of oxygen (Levin, 1995).

Third: sustainable design proposals that seek to positively affect the environment and human (Figure 8).

Trends Strategies

Figure 9 and Tables 1-3 show three strategies and related trends and tables.



**Figure 9: Strategies and related trends.**  
**Source: Al-Alwan (2017).**

### Common Strategies for a Sustainable Design according to Concept of Inclusiveness

McLennan wrote in the philosophy of sustainable design that “successful sustainable design requires a shift in thinking about the current situation and how to put things together and how they work in relationship, and if one name had to be put into sustainable design process it would be inclusive design” (Brown, 1996). Inclusive design can represent the combination of all sustainable design trends that have been categorised within scientific theses as a basis for sustainability, which includes the first approach that seeks to reduce negative Impact. On environment and second approach that seeks to reduce negative effect on health, finally third trend (Millar, 2013), which aims to have positive impact of environment on humans. Figure 8 shows the

**Table 1: First trend strategies**

Sustainable design strategies that aim to reduce the negative impact on the environment (Paying attention to healthy values of the environment, preserving resources and achieving economic efficiency)	
Caring for health of environment	<ul style="list-style-type: none"> <li>• Choose a location carefully to minimize impacts on the surrounding environment</li> <li>• Environmentally responsible and efficient operations are used all way through the life cycle of a building, from choosing a site to building, operating, maintaining, refurbishing, and dismantling it.</li> <li>• Environmentally friendly design practices pay close attention to the smallest of aspects.</li> <li>• Using green energy technologies to reduce emissions of dangerous gases into environment.</li> <li>• Use, storage and management of renewable energy in controllers in order to save resources.</li> <li>• Use of materials and fuels with low environmental pollution and carbon emissions has expanded in the modern world.</li> <li>• It is necessary to reduce the influence of urban temperature islands</li> </ul>
Attention to resources, energies and materials	<ul style="list-style-type: none"> <li>• Models taken from natural ecosystems can be simulated in their energy and movement of materials without causing disruption to the ecosystem</li> <li>• Processing natural resources as input via recycling and reuse processes are examples of resource management.</li> <li>• Rainwater and landscape management to reduce the disruption of natural watershed functions</li> <li>• Reducing resource depletion through recycling and using environmentally friendly building materials</li> </ul>
Preserving biodiversity	<ul style="list-style-type: none"> <li>• Protect, restore and restore local air, water, soil, plants and animals</li> <li>• Preserve wild habitats, wetlands and nature assets</li> <li>• Preserve landscapes, forests and biodiversity in regions.</li> <li>• Airport water and landscape management to reduce watershed dysfunction</li> </ul>
Achieving economic efficiency by ensuring public services and energy	<ul style="list-style-type: none"> <li>• Support for pedestrian, bicycle and mass transportation</li> <li>• Reducing all types of energy use</li> <li>• Save water to increase efficiency and reduce water and energy expenditures.</li> </ul>

Source: Researchers depend on (Al-Alwan, 2017).

**Table 2: Second trend strategies**

<i>Attention to the health values of the environment and its occupants with sustainable design strategies</i>	
Improving quality of indoor environment during construction and operation stages	<ul style="list-style-type: none"> <li>• Use of natural materials (clay, bricks and finishes such as plaster free of harmful substances in construction.</li> <li>• Use of building materials free of VOCs during the construction and renovation of buildings and homes.</li> <li>• Using natural materials for furniture</li> <li>• Treatment of factory and laboratory waste</li> <li>• Maintain thermal balance and moisture inside the building</li> </ul>
Take noise reduction measures	<ul style="list-style-type: none"> <li>• Dimensions of housing sites factories and main roads.</li> <li>• Separation of houses in design procedures</li> <li>• Use double glass to increase insulation windows</li> <li>• Use of sound-absorbing materials</li> <li>• Indoor use of plants for their ability to dissipate sound waves</li> </ul>
Attention to natural light and its properties	<ul style="list-style-type: none"> <li>• Introducing as much natural light into a building as possible while maintaining the ability to control and regulate it</li> <li>• Making use of solar energy that is collected passively</li> <li>• Make use of lights with low glare ratings during daytime.</li> </ul>
Attention to values of comfort for occupants	<ul style="list-style-type: none"> <li>• Natural ventilation and air movement aspects should be considered in design process</li> <li>• Taking into account water in the design</li> <li>• Using radiation heating instead of air heating, so as not to negatively affect human health.</li> <li>• Capacity to regulate the comfort of user by adjusting the temperature</li> <li>• selecting housing sites in a way</li> </ul>
Keep away from sources of magnetic fields	<ul style="list-style-type: none"> <li>• Choose locations away from electric power or mobile towers</li> <li>• Fiberglass</li> <li>• Use of non-magnetic iron in buildings</li> </ul>

Source: Researchers depend on (Al-Alwan, 2017)

**Table 3: Strategies of third trend**

<i>Sustainable design strategies which increase interest in promoting a positive relationship of people with nature in the built environment</i>	
Provide outdoor entertainment places for rest	<ul style="list-style-type: none"> <li>• To open open spaces and provide views of natural landmarks</li> <li>• Design and create environments with features of natural environments</li> </ul>
Emphasis on overall dimension in design	<ul style="list-style-type: none"> <li>• Integrate traditional environments with modern environments.</li> <li>• Separation of homes in design is one of the comfortable design procedures</li> <li>• Avoid design tendencies that undermine the environment and culture</li> </ul>
Emphasis on organic dimension in design	<ul style="list-style-type: none"> <li>• Simulate natural patterns and shapes symbolically by employing fractal patterns.</li> <li>• Using natural materials, shapes and natural patterns</li> </ul>
Utilizing natural features directly or indirectly	<ul style="list-style-type: none"> <li>• Water's purpose in architecture, whether in its natural form</li> <li>• Use of afforestation trees, ceilings and walls</li> </ul>
Utilizing natural features that restore and renew learning	<ul style="list-style-type: none"> <li>• Providing informative and intellectual values of nature</li> </ul>
Providing values that improve motivation for work, feelings of Satisfaction	<ul style="list-style-type: none"> <li>• Using natural and ventilation</li> </ul>

Source: Researchers depend on (Al-Alwan, 2017)



inclusive design of sustainability trends (Huelat et al., 2008).

### Results and Discussion

The results of the study depended on a set of outputs which resulted, and the most important of these outputs were:

- (a) Three elements (nature, man, and architecture) cannot be separated to deal with the negative impact of any one of them on the other two elements.
- (b) Nature is represented by desirable elements mainly because of its aesthetics and becomes useful and necessary elements for obtaining clean energy, saving water and improving air quality without losing its aesthetics.
- (c) Architecture should acquire a new personality aiming at a balanced relationship between architecture and nature.
- (d) The relationship between architecture and nature is embodied through structures and buildings of various uses, size and shape, and organisation of green and blue infrastructure.
- (e) Human dimension, human presence in society is a connection to an area full of “moving” matter such as elements of nature and people, and non-living things such as architecture.
- (f) Cities are more friendly and lively. People in these cities are more attracted. And that public spaces in the city are becoming more attractive, more used and more sustainable in the end because there will be more natural activities.
- (g) Sustainable design inspires a relationship with nature with its propositions and orientations to meet dimensions of sustainability.
- (h) Inclusiveness design seeks to use sustainability standards, taking into account values of community health and preserving natural features that help a person feel prosperous in work and leisure places as his ultimate goal.

**Thus, the main results are as follows:**

1. It is not possible to separate three elements (nature, man, and architecture) as any of them negatively affects the other two elements.
2. Imitating nature with desirable elements that are sought primarily for their aesthetic qualities, and transformed into useful and necessary elements for generating clean energy, and conserving water and air quality without sacrificing their aesthetic qualities.

3. Architecture adopts a new identity that promotes harmonious interaction with nature and is considered an important matter, of engineering.
4. The relationship between architecture and nature is embodied through structures and buildings of various uses, size and shape.
5. Human dimension in society is a connection to nature full of “moving” matter, subject to its existence.
6. Cities are becoming more dynamic, and people in them are more receptive to the idea. Public spaces in cities will become more attractive, more usable, and subsequently more sustainable as a result of an increase in natural activities that will be more widespread.
7. Sustainable design aspires to a relationship with nature to meet dimensions of sustainability.
8. Design of inclusion seeks to use criteria of sustainability, taking into account values of community health and preservation of natural features that help a person to feel prosperous in life in the workplace and leisure and achieve the concept of “perfection”.

### Conclusions

1. The philosophy of sustainable design is a conscious philosophy. It is the design philosophy of physical objects and the built environment in relationship with economic, environmental and social sustainability with its cultural and spiritual values. Sustainable design is environmentally conscious design, in all its forms, and it is a concept of permanence and green.
2. The sustainable design aspires to a relationship with nature to meet the dimensions of sustainability. Then focus on the economy and then pay attention to design values that seek to care for human health and performance inside the building, especially after diagnosing the appearance of buildings and places.
3. Ecology concept is a broad concept associated with sustainable design as a broad design philosophy based on a balance between resources flowing between elements of ecosystem.
4. Relationship between sustainable design and ecology is a system of mutual influence between elements, such as studying the effect of buildings on occupants and the environment and the impact of occupants on the environment, called human ecology or building ecology.



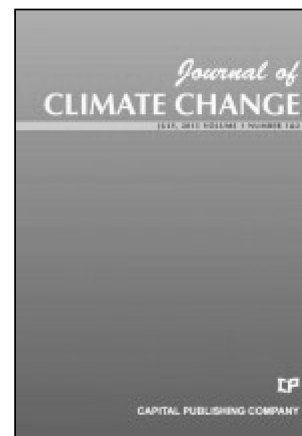
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