

# Biophilic architecture, the concept of healthy sustainable architecture

Associat prof. Dr. Arch. Amjad Almusaed<sup>1</sup> Dr. Ing. Asaad Almssad<sup>2</sup> Dr. Adm. Zaki Khalil Abdushaik<sup>3</sup> and Dr. Agro. Salih Khalil<sup>4</sup>

<sup>1</sup>Arkitektskole, Aarhus, Denmark

<sup>2</sup>ABETONG AB - Hallsthammar, Sweden

<sup>3</sup>Almustansrie university, Baghdad, Iraq

<sup>4</sup>Mesopotamia irrigation, Babylon, Iraq  
Amjad\_almusaed@yahoo.com

**ABSTRACT:** Today, upon reflecting on the various settings and experiences of our lives, we should be able to find some fairly close matches between characteristics we like and characteristics that would have improved our chances of survival. In our course we perceive that the natural contiguous keeps us healthy and in turn, probably promotes physical performance as well. Occupants of built environments don't want simply to work, play, eat, or sleep in a functional building. They want to be inspired, invigorated, comforted, and reassured by their surroundings. They want spaces that will make them more appropriate, comfortable. Biophilic architecture offers an exciting opportunity to achieve environmental, moral, social and economic benefits. Much remains to be understood about energy, environmental and life-cycle processes to engage young and enthusiastic researchers in the world-wide green architecture community and for those interested in biophilic architecture. The concept of biophilia deserves a deeper explanation. The hypothesis is that this affiliation leads to positive responses in terms of human performance and health even emotional states. The new movement aims to create environmentally friendly, energy-efficient buildings and developments by effectively managing natural resources.

**Keywords:** biophilic architecture, Health, ecologic, energy, green building elements

## 1. INTRODUCTION

The earth is our sustainers, the chain of ecologic survival. Renew ability is the key to our human range and our prime resource for architecture. Earth sheltering earth handling and earth escaping are more clearly pronounced in the vocabulary of architectural planning and design. Every site is definite as to its location, natural relief, local vegetation, and its macro-microclimate.

One of human body reaction in environment consists in achievement of the adaptation poise through the building a protective cover. This behaviour attitude, observe to man, has one of the explication in neoteny, foetal nature of species. The protective cover appear thus a retort of the biopsychics interneers, understood as orientation to the shelter state. The measurable environmental parameters and performance of plant species in the urban environment and the quantification of the associated benefits are of primary interest.

Architecture biophilic is a part of a new concept in architecture, that work intensive with human health, ecology and sustainability precepts, such a integrate part of architectural formation which must be in optimal proportion with other buildings material. [4] The position of green covering and its area depend

basically on the category of functions that occur under this area. However, the interpretation and final implementation of biophilic architecture must have a regional dimension with regard to environment and culture.

## 2. ENERGY EFFECTIVENESS ON BIOPHILIC ARCHITECTURE

### 2.1 Energy, activity and thermal comfort

The body converts food into energy. The rate at which this is complete depends largely on the activity level. The energy, which is released in this conversion, is dissipated by the body as heat and used for a small part as external work. The sensation of comfort depends to a great degree on the effortlessness. With which the body is able to regulate the one balance, with on one side energy production and heat gain, and on the other side heat loss, in such a way that the internal body temperature is maintained constant at 37C. The factors affecting this comfort may be divided into personal variables (activity and clothing) and environmental variables (air temperature, mean radiant temperature, air velocity and air humidity). The second group of variables is directly depending on technological place and

building design. Sensitivity to indoor function varies considerably as a function of an occupant activity and, as well as other personal factors.

### 2.2. Indoor energy changes and control

The changes of energy can take place also between insides interior spaces. Energy cans changes also by opening of doors. The air change has been measured to about 5 m<sup>3</sup> per opening of door, and with persons in the habitat architectural program there is calculated on ca 130 openings during the day. Other form of energy change is infiltration in which energy is lost from building in two ways one is by infiltration and other by conduction. Air infiltration occurs where there are openings in the exterior envelope. Differences in air pressure at that moment allow too much air to simple enter or exit a building. A very well insulated building possibly will have infiltration losses of around 38% of the seasonal heat losses. As a result, by bio-substantially reducing the infiltration rate, 90% solar heating is without problems achievable. The problem is that infiltration is reduced to this level with great difficulty. The 1.5 air change per hour for standard building are reduced to about 0, 5 air change per hour by income of good quality weather stripping around openings and by caulking building cracks

### 2.3. Energy in the biophilic design

Energy in the biophilic design must be allocate throughout regarding of thermal zones by utilized the energy in diverse architectural functional spaces such as cascade.

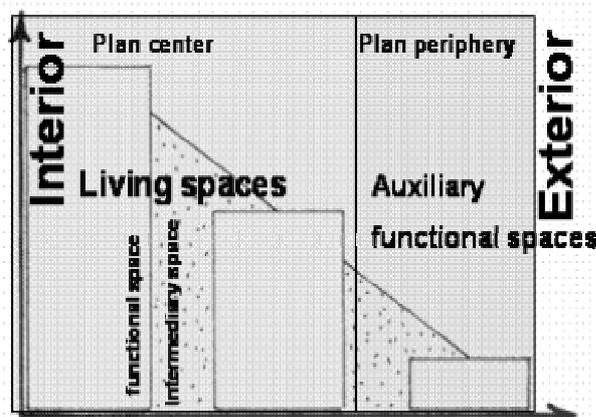


Figure 1: Hierarchy of functional spaces

The first step towards passive biophilic architecture is to reflect the energy distribution on the buildings form and volume, wherever the energy distribute be obliged to correspond the function and activity in those spaces. That is important to regarding the thermal level for different architectural spaces. This form of thermal hierarchy can transform in the architectural plan. It is better to assemblage the interior spaces that have the same temperature and intern contribution. It is better to emplacing essential functional spaces towards the center of the architectural plan, and the spaces which have more

high temperature towards the periphery of the architectural plane.

As a result architects must avoid emplacing of spaces with a large different of temperature collectively. He must use in maximum form the natural convection in a building interior, for achievement transfer of energy to exterior, this difference of temperature is necessary for creation the natural ventilation by airflow. Architects can benefits of the thermal stratification of the air, through a placement of more warm spaces in the highness. Thermal zoning is a vital consideration in recently designed environmental buildings. On the other hand, in an existing building the configuration of spaces was decided by the original architect. One has to adapt to the existing layout, deciding which spaces are used. [5] A thermal zone represents an enclosed space in which the air is free to flow around and whose thermal conditions are relatively consistent. In most cases, any architectural space can be closed off with a door would be a separate zone. Sometimes temperatures in different parts of large spaces can vary. In these cases, the space can be divided into a number of smaller zones with adjoining elements defined as voids. This way heat is free to flow among the zones, but their thermal characteristics can be analyzed individually.

We alike to dissimilar temperature in different functional spaces in residential building for example, we like bathrooms to be very warm, living rooms to be a comfortable temperature, and bedroom to be modest cooler. Well-organized passive biophilic architecture recognizes these differences and creates thermal zones for the different building functional spaces. Thermal zoning tries to ensure the best match possible between the distribution of architectural spaces and the distribution of the available energy. The thermal zones are;

#### 2.3.1. Functional essential spaces

This zone includes principal function in the building. The optimal temperature for these zones in residential spaces for example is between 18-21°C. The best place for functional essential spaces is in extremely centre of the building. Radiant heat from functional auxiliary spaces can penetrate into these spaces. The next best option is with a south, east, southeast facing window in buildings from cold and temperate climate and north east, and northeast in buildings from hot climate.

#### 2.3.2. Functional auxiliary spaces

This zone includes service spaces. The optimal temperature for this zone is between 20-23°C. This zone is modest warm and can located in the periphery of the house plane for create of natural ventilation and to be beside functional essential spaces for create of radiant heat and

#### 2.3.3. Intermediary spaces

This zone includes storage rooms, buffer spaces, transit spaces, terraces, basements, etc. The optimal temperature for this zone is less than 16°C for buildings from cold and temperate climate in winter season, and 28°C for buildings from hot climate in summer season.

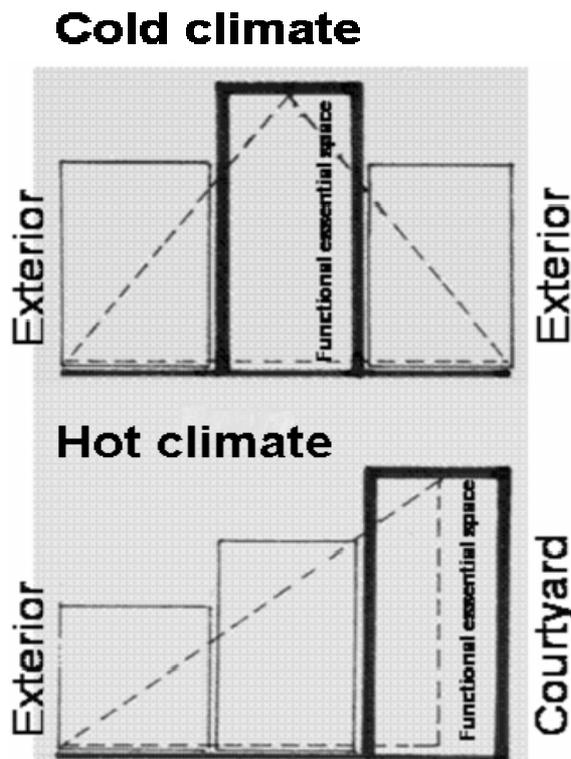


Figure 2: The position of functional essential spaces

### 3. GREEN COMPONENTS IN BIOPHILIC ARCHITECTURE

#### 3.1 Green building elements

The term of green building elements, as vegetated or eco-system refers to an external elements covering that consists of a thin layer of living vegetation on top of an adapted conventional system. [6] Contemporary dry green areas are not heavy, difficult to maintain collections of pots and planters high on top of the city. Instead, they are lightweight, durable systems that are not only beautiful but also provide insulation and help solve vital urban environmental problems. Vegetation protects the external elements from direct solar radiation and enhances its thermal performance. The optimized green buildings elements described in the following wording, with a green leaf area 5 to 10 times higher as the one of a green park, are a much more effective and economic means to create better climatic living conditions in cities.

The green component surrounded by the architectural composition usually appears in the form of a green roof and less often in that of a green façade outside layer. The latter may especially be found in vernacular architecture. The green components of architectural elements coating is typical of old vernacular architecture in rural areas, although it may also be found within city areas. Nowadays, plants are rarely used as a finishing façade stroke. The green roofs or façade coating does not indicate that we are dealing with a neglected house as it might seem at a first look. On the dissimilar, it produces many positive effects in terms

of design, construction, health and ecology. Its function is not limited to the mere protection of the façade. The green roofs and façade coating indirectly affects the inhabitants feeling of comfort, and has a significant aesthetic function within the building's vicinity. The biophilic architecture coating significantly contributes to the formation of balance between human and environment.

#### 3.2 Green advantage on biophilic architecture

##### 3.2.1 Energy saving concept

Heat management on different building components is the most effective assess for energy efficiency. Passive biophilic architecture has need of a compact system of insulations, which guarantees for both low heat losses and a high level of thermal comfort. Every building needs a building envelope with a ground floor, exterior walls and roofs; the passive biophilic architecture focuses on extreme improvements to these building components high quality heat insulation is thus supplementary.

Green building elements provide important environmental and human health benefits which cover a large area of advantage and benefits that can be for example in ameliorate the urban island effect and relieving the damage on the ecology of the city, principally concerning microclimate, rainwater retention and filtering of airborne pollutant lowering energy expenditures, purifying the air, reducing storm-water runoff, longer durability of the roof skin, due to lower surface temperatures and better protection against UV-radiation, creation of recreation areas in parts of the city, aesthetical improvements in denaturalized urban centers and many others.

##### 3.2.2 Human health

Studies show that free time activities in natural surroundings such as garden and park are important for helping people handle with stress and meeting other non stress connected needs. This form of green elements increases the value of the property and the marketability of the building. Keep happy the aesthetic requirements of people looking down upon the green area from adjacent building. Psychosomatic researches have shown that the restorative effect of natural view holds the viewers concentration, diverts their awareness away from themselves and from worrying thoughts thereby improving health. The patients were assigned essentially randomly to rooms that were identical except for window view: one member of each pair overlooked a small stand of deciduous trees; the other had a view of a brown brick wall.

##### 3.2.3 Ameliorate of local microclimates

A green building element will have a noticeable impact on the heat gain and loss of a building, as well as the humidity, air quality and reflected heat in the surrounding neighbourhood. In conjunction with other green installations, green elements can play a role in altering the climate of the city as a whole. On a summer day, the temperature of a gravel green area can increase by as much as 25°C to between 50-60°C. Covered with grass, the temperature of the green area would not rise above 25 C, thus resulting

in energy cost savings. 20 cm of substrate with a 20-40 cm layer of thick grass has the combined insulation value of 15 cm of mineral wool. Spaces under a green building elements are at least 3-4C cooler than the air outside, when outdoor temperatures range between 25-30°C. Green building elements combat the urban island effect due to the increased vegetation they bring to the urban landscape. Plants cool their surrounding environments through natural evapotranspiration cycles. [7] By means of more green buildings elements in the city and less hard, nonporous blacktop, our cities can be cooled down. This procedure reduces the urban heat island effect in summer. This can play a role in reducing greenhouse gas emissions and adapting urban areas to a future climate with warmer.

#### 4. MARKETING POLICY

For marketing, the general trend to wellness and health, high living quality and modernity could be used. The economical biophilic architecture provides us with the opportunity to reach extremely low levels of energy consumption by employing high quality, cost-efficient measures to general building components - such measures are in turn of advantage to the health, ecology and economy sector.

A conflict often appears in architecture between the economical aspects, on one hand, and the quality of architectural products on the other hand. Our mission is to realize a device that represents the balance that can be created by a functional-constructive issue generating the healthy and the economical forms of architectural produce. The concept of optimal biophilic architecture takes in evidence the optimal balance between the quality and all economical aspects.

#### 5. CONCLUSION

The vital objective of biophilic architecture is to outline attributes and put them into a clear, sensible, organized format so developers, designers, planners, and architects can learn about the importance of a connection to the natural environment in all their building projects.

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