

The basic principles of sustainable architecture

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Abstract

Contemporary architecture works according to a linear model, meaning that it takes in fresh air, energy generated from fossil fuels, drinking water, various building and other materials necessary for life and having squandered them inefficiently, it releases stale-air, smoke, fumes, sewage, noise and refuse that will chemically pollute the environment.

In 1994 at the CIB conference held in Tampa, Florida, C. Kibert clearly voiced what needs to be done. Accordingly sustainable architecture is: creating and responsibly sustaining a healthy built environment, responding to the ecological needs and making optimal use of energy without over-exploitation of natural resources. This means that the burden on nature must be reduced with the help of sensible compromise, legal-financial regulation, technologically clean building materials and products and at least a partial abnegation of consumer mentality.

Keywords

- environmental crisis · sick building syndrome · ecology · sustainable development · sustainable architecture · healthy built environment · energy-conscious and environment-conscious architecture · environment-conscious buildings · alternative-renewable energy and building material · alternative ways of construction

This article addresses the basic tenets of sustainable architecture in response to the dangers of the growing sick-building syndrome and the degradation of the earth's biosphere.

Air, water and soil pollution, global warming, overpopulation, health and social problems, waste disposal issues, and the fear of the approaching exhaustion of fossil fuels announces an environmental crisis for humanity. A cultural and aesthetic pollution can also be observed.

The reason for these phenomena is the world-wide spread of the Euro-American production and civilization model, based upon a technologically innovative, high energy input, consumer oriented short-term profit approach. The balance between social spheres has been overturned with the economic sphere gaining dominance.

After World War II, progress was identified with unrestricted technical development and unlimited consumption, while natural resources and waste disposal were considered inexhaustible. Consumer mentality typically excludes nature from everyday life. City-dwellers spend about 80 % of their time indoors, in closed inner spaces, in surroundings that are in every way artificial. People themselves turn into artificial creatures, guided by advertisements and 'experts'. For compensation we got the so much coveted comfort, but this comfort comes with a price. After millions of years of organic development our organism is incapable to adapt to the extremely rapid and thorough changes that uninhibited technical development brings about. We fall ill. The sick building syndrome, SBS, is well known, mostly causing respiratory illnesses, allergies, diseases connected with metabolism or the central nervous system and even cancers.

The appearance of the predominant built environment pervades almost every scene of life. Building involves processes of extraction, production of base-material, semi-finished and finished products, transport, renovation, demolition and the disposal of rubble. One of the significant causes of the present environmental crisis is the practice that has evolved in recent decades in which construction sites spill over onto large areas during the building process. We did disturb nature in the past, but the interference was always local, shallow and slow, allowing nature to adapt to changes and with time recuperate and re-

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gain the area temporarily lost. The difference today rests in the size of the interference, its speed and complexity, and of course in the destructive business / consumption mentality.

Contemporary architecture works according to a linear model, which means that it takes in fresh air, energy generated from fossil fuels, drinking water, various building and other materials necessary for life and having squandered them inefficiently, it releases stale-air, smoke, fumes, sewage, noise, garbage that will chemically pollute the environment.

In order to avoid environmental catastrophes and large-scale human tragedies, new methods should be employed that radically differ from present day practice.

Ecology was defined by E. Haeckel in 1866 as domestic science, as the science of relationships connecting living creatures with the world around them, including all the conditions of existence. Indeed, in the past mankind co-operated with nature, but today we only consider it as a resource and exploit it uninhibitedly. We must return to co-operation, to a responsible economy, to respecting the 'rights of nature'.

In 1994 at the CIB conference held in Tampa, Florida, C. Kibert clearly voiced what needs to be done.

Accordingly sustainable architecture is: creating and responsibly sustaining a healthy built environment, observing the demands of ecology and optimal energy use without over-exploitation.

This means that the burden on nature must be reduced with the help of sensible compromise, legal-financial regulation, technologically clean building material and products and at least a partial abnegation of consumer mentality.

The terms "sustainable, ecological, energy-conscious or environment-conscious architecture", all reflect an extremely complex perspective or point of view and is the answer of engineers to environmental problems. A significant number of architects, however, do not take up the challenge, which might be due to the fact that in their view the set of problems we face cannot be dealt with as mere aesthetic issues.

Environment-friendly is the building that employs such functional and technical solutions that, together with the use of the building, is in harmony with the recovering capacity of the environment

- matches the cyclical processes of nature
- does not harm health

ECO buildings have existed since the historic past. They are built using such traditions and know-how of generations that take into consideration such opportunities as the characteristic properties of the wind, sun, currents of air, vegetation, water surfaces, and natural sources of light. They use natural materials known for a long time in ways based on tradition and experience.

Environment-conscious buildings, in contrast to those of the linear model, need minimal, especially renewable energy and

material supply, which are then used economically, without producing much waste.

The basic principles of environmentally conscious architecture are:

- Locational, functional and structural solutions need to be selected in harmony with the local conditions, such as topography, microclimate, soil composition, water surfaces, flora and fauna etc.
- Size must be limited, including the footprint, i.e. the reduction of used green areas.
- Natural features must be enhanced and it is advisable to use renewable energy resources such as solar energy, wind, biomass etc.
- The daily use must be carefully planned and organized, otherwise the building cannot be considered ecological.
- Building structures, sanitary engineering systems, alternative ways of construction are to employ environment-friendly building materials and take ecological construction theories into consideration.
- Environment-conscious ventilation, energy, material consumption must be observed in the functioning of the building as well.

The above mentioned principles can rarely be completely realized in their pure forms. In urban environments, for example, there is not much possibility to "bring in nature", yet a nature-sensitive mentality must prevail. The existing buildings should be 'tamed', restored in an environment-friendly fashion. If clients co-operate, some sensible compromise can always be reached. An all-round examination of the problems needs to be carried out, for an arbitrary selection of aspects, such as, for instance, energy-saving, is not an efficient solution.

Although the application of the methods described above has no theoretical obstacle, there are very few ecologically constructed and utilized buildings. Many times the misunderstanding is caused by insufficient information and unfortunately products that are not at all nature-friendly are "dressed in green" and their harmful effects on the environment and human health is not disclosed.

The fact that ecological building costs more than building the way we have more recently grown accustomed also plays a role. Costs, however, can be reduced by careful planning and expert advice, whilst due to economic energy and water consumption, in the long run ecological building costs are lower.

The ecological aspects enumerated can all be found in traditional peasant houses. These houses are often mentioned as manifestations of ecological building and lifestyle. Before industrial food production was introduced, villages worked as small-scale economic units within their natural environment. Produce was processed entirely (even by-products could be used

for covering roofs, or as fuel) and the surplus was sold in the vicinity and even rubbish was recycled. There was a dynamic balance between the sustaining power of nature and human exploitation. All this resulted in full responsibility, working communities and a specific culture. Situating the buildings in the landscape, using and re-using natural materials, and to a certain extent even the way the buildings were used matched the ecological requirements.

It is no wonder that in recent years due to hectic town-life and pollution more and more people are buying village houses, modernizing them and moving in. The so-called bio-farms are mushrooming. Adobe, as a building material, has its renaissance.

Economical mechanical equipment that use alternative energies as well as natural materials are also available in Hungary and abroad, genuinely environment-friendly products have been developed with appropriate quality control. It is true that the maintenance and sheer functioning of ecological buildings requires a lot of attention, but they are worth the effort. Unless we change present-day practice and choose nature-friendly construction, catastrophe cannot be avoided. Co-operation with nature is the only path that serves the interest of life on Earth.

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