



THE ROLE AND IMPACT OF PHYSICAL TOWN PLANNING, URBAN DESIGN AND ARCHITECTURAL BUILDING PRACTICES IN ENVIRONMENTAL SUSTAINABILITY

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Abstract

This article, based on a literature review, takes cognizance of the ecological interdependence of the natural environment and the need for its sustainability. Towns and urban centers occupy a built environment of a miniscule proportion of the world's land surface but utilize well over 75% of the world's resources and discharge similar amounts of waste, and argue for the importance of collaboration and sound approaches in physical town planning urban design and architectural building practices.

Key Words: Physical planning, urban design, Architectural design, Environment, Sustainability.

Introductory Background

Following the adoption of the Habitat Agenda by the second United Nations Conference on Human Settlements (HABITAT II) in Istanbul in June 1996, it has become obvious that it is the Environmental Design Consultants who have to spearhead the protection and sustainability of the environment through sound practices and campaigns for the promulgation of supportive policies and legislation (Un Habitat: 1996).

The Agenda 21 for sustainable development was agreed by world governments in 1992 at the Earth Summit in Rio. This has been echoed by the Union of International Architects (UIA) and American Institute of Architects (AIA) at the World Congress of Architects held in Chicago (June 18-21, 1993) whereby the declaration of interdependence for a sustainable environment for the future was made (EAAE: 1995).

The first global conference on human settlements (Habitat I) was held in 1976 in Vancouver Canada. Subsequently, there have been others – including the latest Habitat II, the United Nations Conference on Human Settlements, the “City Summit”, in Istanbul, Turkey, in June 1996 in particular underscored two major challenges in so far as town and country planning, as well as urban design is concerned:

- provision of adequate shelter and livelihoods for the world's ever-growing numbers of urban citizens
- achieving sustainable human settlements in an urbanizing world.

Noteworthy is the realization that the human species is involved in an unprecedented stage in its evolution whereby it is turning itself into an urban species with large cities (others mega, rather than villages and towns), becoming our primary habitat. Indeed in a few years from now, over 50% of the world's population will be domiciled in cities. Thus city growth is changing the face of the earth and the very condition of humanity (Jones: 1990).

Noteworthy is the acknowledgement that cities provide major opportunities for sustainable development, given that they accommodate large numbers of people in a limited space; noteworthy, cities only occupy built on approximately 2% of the world's land surface; but they use over 75% of the world's resources and discharge similar amounts of waste (Population Crisis Committee: 1990).

Thus the big issue is the environment – the impacts of cities as felt locally as well as internationally. Take pollution for instance, city populations as major users of energy cause both regional and worldwide air pollution with dramatic impacts on the health of people and the biosphere. Governments, local and central, are increasingly aware that efforts to improve the living environment must be focused on urban centers. Sustainable urban developments are, therefore, the most pressing challenge facing humanity in the twenty first century.

Arising from this challenge are key themes that have to be considered by the afore-mentioned Practitioners:

- curtailing of the vast appetites of the cities for resources, and their huge waste discharges
- turning of the urban settlements into a resource and energy-efficient home for humanity
- making efforts to improve the environmental performance of our cities to create new opportunities for urban employment and sustainability.

Generally, we have become aware, from the numerous documentations and empirical data, that building activities especially in towns and urban centers, are responsible for an upward of one third of ecological disasters (Grim, N.B. et al: 2008). It therefore leaves no doubt that sooner than later, buildings have to be designed and constructed in a sustainable manner.

Considerable efforts have been taken so far to build sustainable buildings, especially in the western world, inspired by Agenda 21 but these results are not enough to give real hope. Therefore, we have to work further in order to create awareness about the problems and to take practical steps towards creating a balance between people, buildings and the environment – more so in the developing world where there are high population growth rates, but with scarce and dwindling resources. At the same time, we have to realize how important it is to consider the local and regional circumstances, demands, limits and also opportunities given migration trends in especially in developing countries exacerbated by political, economic and social turbulences (UN Habitat: 2010).

This paper makes an attempt to explore ideas, models, methods and examples on how healthy and environmentally sound town planning, urban design and architecture practices can be promoted and how this could contribute towards sustainable development and survival. These are only humble begins in this very delicate, and yet complex, subject matter.

Construction versus Health and Environment

Some environmental protagonists have argued, perhaps rightly so, that the most environment friendly behavior to be observed is not to build at all because activities associated with this will somehow hurt the environment. On the other hand, we need shelter, among other things, to protect ourselves against the vulgaries of weather and other harmful hazards. The opinion that the environmental disaster can only regenerate without any influence of human beings opposes our existence and needs to develop and flourish whatever this might be. Being at the same time a part of nature, and being gifted by a high potency of free will and the ability to influence the surroundings significantly, we have to find a balance between the above given extremes – a dynamic equilibrium so to speak (Meier: 1992; Seager: 1990).

In the light of the above discourse, it can be asserted that the construction activity opposes the environment, while its main function is to maintain human health and safety. But, looking deeper, the latter seems to be unfortunately not always the case. Firstly, we impact the environment by our building activities so negatively that the revitalization of the environment becomes almost impossible. One of the consequences of this is the visible influence on our own health. Secondly, we are confronted more and more, with the phenomenon of the ‘Sick Building Syndrome’, not only in office buildings, but also in dwellings and even other institutional buildings of human activity. Despite attempts to build for higher comfort, we often ignore the health aspects of buildings. This phenomenon is highlighted in many studies and academic for a (see, for example, Cambridge Forum for Sustainability and the Environment: 2013-2014). Thus there is no doubt anymore that a radical change has to take place in the way we plan and build our towns and buildings.

Deterioration of the Environment

Building activities change the natural environment by over-exploitation, pollution, and by deterioration of the surface planet. Studies have shown the manifold effects of winning, transporting, producing, using, maintaining, renovating, recycling and dumping of building materials and components. The basic principles behind all of the building materials have always been the same - the less a material is renewable, the more negative effects (like exploitation, pollution and deterioration) it will have on the environment. The more handling, treatment and adaptation needed in order to produce a building/component, the higher is the chance for deterioration and exploitation. This is the thesis that Milligan has tried to develop and articulate in his studies of the major U.S. cities (Milligan: 2003).

Since socio-cultural environment is part of the whole environment, we observe also a certain influence of town planning, urban design and architecture on the so-called mental environment. Besides all good intentions, philosophers, historians and psychologists already have carried out numerous studies that show the oppressive impact associated with the built environment – inhuman buildings (for instance, consider the prestige and expensive way to build for the low-income practices which hinder us from applying cost-effective and socio-culturally acceptable methods in order to build for the resource-strapped teeming populations) (Hunkle: 1979).

Use of Resources

Non renewable natural resources are limited on the planet. Consequently, we have to search for renewable materials and production processes which also allow re-use. This postulate leads to the choice of materials, derived from growing biomass, with the condition of sustainable management concerning ‘harvesting’ of these materials. For example, in order to ensure sufficient timber supply of cedar trees for continuous, ‘rhythmic’ building of Ise Shrines, ancient Japan had a 500-years forestry policy. Nowadays, we should pick up such marvelous models which have already worked practically in the past.

The already dramatically reduced tropical rain forests should be a warning signal for us. Regional and local resources have to be handled carefully and the treatments during production have to respect and include clean, waste free and non-violent methods. Resources should be used according to the concept of continuous recycling or life cycle, as realized in nature. An ideal situation would be one where it is possible to share the available and renewable resources with all the peoples of the world. Unfortunately, despite numerous United Nations Conventions that have been established to create a more balanced distribution of these resources in the world, we are still far away from a situation in which justice would be the reigning principle (Canfield: 1990, Daily: 1997).

But before we can be carried away by the romantic notion of sharing resources between nations, it is imperative and dutiful to first cultivate and make use of the local and regional resources. This is both useful for identity and character of a locality or region and also cheaper and easier from the consideration of transportation point of view and hence cost. Needless to reiterate the familiar and appealing clarion of the advantages inherent in the use of traditional and local materials – giving of new impulses for nearly forgotten technologies and, in many cases, leading to opportunities for employment and appreciable savings. As has been shown in many documented studies that have been done, most of the developing countries largely depend on imported conventional building materials and components (Malpenzi: 1987). Various studies have also shown that these building materials constitute the single most input in the construction of housing, often accounting for as much as 80% of the total value of a simple house (SheltNet: 2014). The other revelation is that the available conventional building materials are either prohibitive in cost and/or scarce in supply.

Use of Energy

Excessive use of energy also leads to exploitation and environmental deterioration. Main sources of energy, such as mineral oil, coal, natural gas and even wood are not inexhaustible. We have, therefore, to intensify the production and use of renewable energy sources for construction and for the operation of the existing built environment – exploitation of

wind and sun provide good examples for these efforts. Care must also be taken not to waste energy and to handle the process of production and application without negative side effects.

Active and passive application of solar power – directly or indirectly – belongs to the first possibilities and opportunities to save energy. Wind, hydraulic, tidal, water wave and earth heat form energy resources for local use on large scale (McDonald et al: 2008). Here, the assumption is that new and inexhaustible energy sources will serve humankind without any problems. It perhaps means that nothing will get lost in the cosmos!

Other considerations in the saving of energy would entail use of locally available building materials whose thermo-physical properties, such as earth construction, have been acclaimed. As indeed attested to by the famous Hassan Farthy, the thermal conductivity of stabilized soil blocks estimated to be 0.5 - 0.7 W/M°C compared favorably to 0.7 - 1.3 and 1.0 - 1.7 W/M°C for conventional imported materials (Farthy: 1997).

Pollution of Earth, Water and Air

Building activities belong to the main part of human civilization, which are very much resource-intensive. Generally, it is estimated that about one third of the whole pollution stems from building activities. The production of metals, different mineral products, synthetics and paints are highly polluting. The waste on sites and production processes, including hazardous waste, are hard to reduce appreciably. The surface of the earth, for instance, is covered by all kinds of buildings – themselves pollutants – besides the mental pollution. The principle of a non-violent building practice has to be worked out which will help to solve the manifold pollution problems at several levels – this is the import of ‘Environmental Impact Assessment’ practices now being embraced worldwide (Milne: 1989).

Eco-eco Friendly Architectural Design

This is basically the underlining of both Ecology and Economy considerations in striving for a sustainable development. An Eco-eco friendly architectural design has to include the health and environmental aspects and approaches. The realization will undoubtedly be depended upon political will and favorable regulatory environment.

Among examples for both ecology and economy environments are proceedings of various fora and publications devoted to healthy, or environmentally sound planning and designs, whereby there have been efforts by experts striving towards buildings with the described qualities through many attempts by some NGOs and a growing number of governments. Numerous conferences are dedicated to sustainability and building construction, in relation to health. Thus the aims of sustainable built human settlements include:

- use of clean materials, or materials with less embodied energy
- more efficient installations and equipment
- energy saving by using passive and active solar technologies – here the assumption is that active solar power with all necessary equipment is more environment friendly than the traditional solutions
- waste management during the production process of materials and on the site.

Conclusion

Healthy and environmentally sound town planning, urban design and architecture was, is and will be possible. All that is required is the integration of the relevant factors in order to reach a balanced result and a holistic success. The future town planning, urban design and architecture ought to combine the demands for health and environment as bases for our lives.

Resources should be used selectively and carefully. Over consumption of non-renewable resources and energy should be avoided and cultivating and using renewable resources should be encouraged – renewable energy production and application have to gain a high priority.

Recommendations

The following brief recommendations are to be taken as ‘Rules of Thumb’ – as an attempt towards sustainable and best practices in town planning, urban design and architecture:

- location, orientation and use – choosing of a healthy site that takes into consideration orientation and optimization of function
- space and mass – shape is useful (closed or open) in protecting space; it also establishes identity and expression of the built form
- canon, modular coordination – application of harmonious and ergonomic measures, dimensions, weights – modularly coordinated – renders meaning and reduces energy consumption by the built environment
- indoor climate, installation, furnishing – create cozy and comfortable indoor climate with minimal installations and a flexible equipment and furnishing in order to have a suitable atmosphere
- structure and construction – design simple, understandable and durable structures, which do not demand various kinds of means (e.g. lifts, escalators, etc.) because of their gigantic character
- energy and material – use mainly durable, sustainable (available/renewable) easily reusable or recyclable, clean energy materials
- production and building process – produce in a humanly healthy way with a wise choice concerning handicraft or industry, self-help and in cooperation and participation at all possible levels
- the art of joining/assembling – join/connect/compose all building parts or elements in a harmonious way, rather solidly but demountable for efficiency and reduction of costs arising from energy utilization.

Lastly, since collaboration is one of the main methods on the way towards sustainability (in research, education, theory, design and practice), there ought to be cooperation among the diverse actors whose pre-occupation is with

physical town planning, urban design and architectural building. This is in view of the fact that the activities cited above do overlap and, therefore, there should be intra- and inter-borrowings of findings and insights in their practices.

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