TITLE:

ECOLOGICALLY INTEGRATED SPATIAL PLANNING CONCEPTS

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Abstract:

Since the 1970s there has been a growing awareness of the need to bring environmental values to the development of land and the management of natural resources. Ian McHarg, Lewis and other eloquent exponents of the Environmental planning movement have brought into focus the evolving philosophy that ecological processes provide the indispensable basis for planning and design. Though, this view has been accepted by many, its potential and applicability still remains unexplored at local planning levels. This paper attempts to develop an integrated concept for planning based on ecological principles through the case studies of two major zones in Mumbai Metropolitan Region- The Mumbai city and Thane. These two case studies are a part of the authors extensive research based projects for the local authorities in Mumbai.

INTRODUCTION:

Today the rapid and haphazard trend of urbanisation in Mumbai and its suburbs has extended relentlessly beyond its administrative boundaries. This explosive growth of urban areas has brought about fundamental changes, not only to the physical landscape, but to people's perceptions of land and environment. Consequently,unsustainable pressures are placed not only on the environmentally sensitive landscapes but to the basic natural processes that have contributed to the physical form of the city. The urban environment has been shaped by a technology whose goals are economic rather than environmental or social. The paper examines the impacts of this growth trend on the region's natural resources and critically reviews the relevant environmental regulations through the case studies of two major cities within the Mumbai Metropolitan Region- Mumbai and the Thane.

The need for an alternative basis for urban planning that is in tune with the growing awareness of, and concern for, the issues of energy, environment and natural resource conservation is central to the investigation of various issues of urbanisation in both the case studies. Physiographic determinism was employed as a tool to evaluate the extent of the negative impact on the environment, by superimposing the various physiographic features on the land use plans and simultaneously extracting and de-layering to establish the intrinsic suitability of land for various land uses. The study deals with various issues of ecology on one hand and developmental issues on the other. Extensive use of a Geographical Information System (GIS) is made for the analysis and information

envisioning like producing an ecological base map of the area. A critical review of the existing legal provisions for the environmental protection and conservation and the development control regulations is undertaken too.

The Mumbai region:

Mumbai boasts of some very unique and varied environments, ranging from coastal belts, creeks and mangroves, to many hills, forests, streams, lakes and ponds, all of them in a state of intense stress and marginalisation today. The present impetus towards huge investments for huger profits, the import of more 'efficient' earth-moving and construction technologies, the aspirations of newly-inflated incomes, and the steadily increasing population have all put tremendous pressure on the city's natural resources. Thousands of acres of mangroves have disappeared in the last few years; reclamation of the seabed is on in full swing; hills have been flattened, marshes filled in and green areas transformed into barren but super-profitable real estate almost overnight.

The recent downpour and consequent flooding has brought many environmental issues to the forefront. Not only is the city's infrastructure under question but its governance has also come under the scanner. The catastrophic damage to the life and property during the deluge in the city are clear indicators of how the planners and the official guardians of the city have failed miserably in controlling the development of the city. Despite many warnings like the extreme water shortage, drinking water contamination with the subsequent wide spread cases of jaundice, spate of leopard attacks, overflowing solid waste dumps , the rising pollution levels, the current focus of planning in the city of Mumbai is on the proposals like creation of new Central Business Districts, Information Technology parks, luxury housing townships, flyovers and freeways, shopping malls, golf clubs, multiplexes and other high-end entertainment centres, all designed to project an upmarket and global image and just this month the government's notification allowing special townships in no development zones in the city.

In a recent study on the lake region " *Development around the lakes for sustaining the biodiversity and ecological status of the environs"* of the city funded by the Mumbai Metropolotan Region Environment Society and conducted by the author through the Design Cell of Kamla Raheja Institute for Architecture Mumbai, it has very clearly indicated how the major green belt of the city is under severe threat today. With pressures of rapid haphazard development, high and growing population density, relaxation of the building restrictions of no-development zones, and the development of fast moving traffic systems through this area – along with the growth of pollution, encroachments, deforestation for fuel and economic gains, and destruction of natural landforms for real estate development -- all leading to the catastrophic depletion of this, the largest and most precious of the vanishing green zones of the city. The lakes of this region are obviously in especial danger, for the susceptibility of freshwater bodies in urban areas to extensive and accelerated deterioration (eutrophication), especially in watersheds undergoing intense development, is well known. Developmental pressures have however resulted in irreversible destruction of the hills nearby, altering the topography of the catchment and stripping it off its fertile soil and natural vegetative cover. The lakes and their catchments

form key factors of the natural rainwater harvesting system. The reduction in the water holding capacity of the lakes due to siltation is an imminent threat.

Over the years, several concerned citizens have formed varied interest groups to protect the Powai Lake and/or its environment. The work of these groups clearly indicates there is will amongst the local citizens to protect the environment. But without an overall master plan focusing on Ecological spatial planning for the lake region, these measures remain isolated and inevitably limited.

The recent spate of leopard attacks in the surrounding residential areas is testimony to the fact that development has been ecologically incongruous to the environmental boundaries The Development Plan has not taken into consideration or incorporated the eco-sensitivity of the area before allotting land uses for it. There is an urgent demand for an informed and longsighted management of the natural environment and resources within the city, and a need for concerted efforts to radically improve pertinent knowledge, methods and techniques.

The Thane region

The strategic location of Thane region and the availability of the major infrastructural facilities to the Thane region have made it one of the most industrially advanced districts of the state of Maharashtra. Though there has been immense economic growth little efforts have been made to conserve the rich and natural resources of the region. On the contrary all the urban expansions and rampant construction activity in the region during the past two decades have had a negative impact on water systems as the site developments have ignored the local environmental and hydrological considerations.
The region receives upto 2000mm of rainfall annually. The total landscape of the region is unique because of its close proximity to the creek, river and the high altitude ranges with many natural and manmade water bodies. Surface depressions were used as a source of water conservation by the ancient civilization, in the absence of nearby river course. These lakes also provided an intermediate storage in minimizing the surface runoff and floods. However over a period of time due to the demands of urbanization, development has slowly crept up to the banks of these lakes thereby converting the once sprawling water bodies in to mere water tanks which are prone to degradation through development pressure. Within the city core the lakes are totally surrounded by dense high density development .In the process this has not only cut off the visual connectivity from main access routes but also made it extremely complex to ecologically revive the lakes. Embankment stabilization and plantation of trees around the lakes have consumed the active lake area.
There has been an attempt in recent times by the Thane Municipal Corporation to revive the dying lakes through bio-remediation techniques. These techniques have involved exhaustive lake specific studies which are required however in the absence of a comprehensive master plan the efforts to do so have not been as successful, since a water body never stands in isolation but is connected to the surrounding region/area as well. The necessity to have a comprehensive master plan integrating all the phisographic and ecological aspects for the successful revival and management of all the lakes was essential at this stage.

Land use studies with respect to the built form, density, opens space structure and activity patterns clearly indicate an incongruous pattern completely oblivious to the environmental aspects of the catchments of the lakes. For instance a closer look at the major traffic and transportation routes within the city show how they have virtually cut across the natural drainage pattern of the region and in the process completely hampered the natural supply and the overflow systems of most of the lakes. The open space structure plan of the city also shows no connecting corridors for the natural ecosystems nor does it have any significant buffers along the major streams or in the lake vicinity. The major streams of the region are today dead concrete nallas trained haphazardly through the developments. The storm water drainage system has replaced the vibrant biologically active surface drainage ways which have become collectors and accumulators of a number of deleterious or polluting materials including oils and greases, toxic metals, and sediment, that are quickly transported through the system and discharged to the receiving water way without any detention and retention basins.The new developments towards the north of the city core depends heavily on bore wells and ground water for domestic, industrial and commercial use, as well as for all new construction activities. The ground water table in this area is comparatively high precisely owing to the dense forest cover and river floodplains nearby. But it is clear that any alteration in the permeability and water holding capacity of the lakes and surrounding soil as well as indiscriminate ground water extraction will result in the decrease of the water table for the region.

The residential developments have also created a demand for services such as domestic help, etc., which are provided by people living in the slum pockets in the surrounding areas. Hence it is imperative to note that, given the existing socio-economic situation in Thane any kind of middle- and higher-income residential development is bound to give rise to such informal settlements in the absence of any provisions made for these service-providers. All the informal developments including the slums lack basic amenities like toilets, garbage disposal systems and water facilities. This has additionally pressurized the land, the Lakes and all the nallasThe ongoing rapid urbanisation has led to not only the encroachment of all the open spaces but also laying of impervious surfaces all over which could have otherwise helped in percolation of rain water that is extremely crucial for the lakes in the alluvium floodplains..

Although there have been many apparently beneficial socio-economic trends generated by recent urban development in this area, like the increase in housing stock (though primarily for the upper income groups), increase in job opportunities, increase in per capita incomes, and increased generation of foreign exchange, the city of lakes as it was known earlier will no longer be so unless remedial measures are taken up urgently.

Review of the provision of Environmental Conservation in the Development Control Rules

The micro level surveys in both the case studies indicate a development which has been totally oblivious of the need to conserve the surrounding landscape. This has come about despite the provisions of the Environment Conservation measures in the Development Control Regulations for Greater Mumbai, and also in the Regional Plan for the Bombay Metropolitan Region.

Over the past decades, the local government and their implementing agencies have had only peripheral involvement in the environmental protection strategies devised by the Central and State Regulators, even though these local bodies are more responsible for the resultant quality of our natural environment than all the Central and State environmental regulations combined. Long before the Central and the State agencies actually review projects and issue regulatory measures the local government is well ahead prescribing almost every kind of developmental detail, like how residential, commercial buildings, info-tech parks etc. are to be located, which water supplies are be used for these developments and where the local roadways are to be placed, all of this determining the resulting landscape. According to the Supreme Court directive passed in 1996, it is the responsibility of the developer to ensure that the construction is environmentally benign. Despite this, environmental considerations are almost always overlooked.

The Development Control Rules and Regulations do incorporate measures to minimize the environmental damage. And these are certainly well intentioned. But there is a dark side to their application. The scope of the measures rarely extends beyond the boundaries of each individual project site. These mitigation measures embodied in the local ordinances are directed towards on-site control of acknowledged negative environmental impacts. These mitigations give a false sense of security that such impacts can be readily ameliorated on each site; and even if they cannot, the effects on the natural environment are alleged to be inconsequential. There must be a greater reliance on preservation of complete ecosystems and less reliance on attempts to mitigate the damage we have done to them.

For instance, according to the ordinance in the **DC Rules and Regulations** ***Part II; General Planning Requirements: Land uses and Manner of Development,***

16. Requirements of Sites: -

No land shall be used as a site for construction of buildings if

(n) *The proposed development is likely to involve damage to, or have deleterious impact on, or is against, urban aesthetics or environment or ecology and/or on historical/architectural aesthetical buildings and precincts, or is not in the public interest;*

The terms here are not explained precisely or specifically and nor are the environmental features clearly demarcated spatially on any of the sanctioned maps making it almost impossible for the Zonal Commissioner to take any action.

Zonal Planning and the need for Comprehensive Development Plans

The Zonal Planning Act envisioned a more comprehensive approach to regulating land uses by preparing master plans for the physical development of the area under the Municipality by making careful and comprehensive surveys and studies of present conditions and future growth of the area, with the general purpose of guiding and accomplishing a coordinated, adjusted and harmonious development. These comprehensive master plans have a distinct provision for the preservation, conservation and utilization of natural resources, including energy, open space, water supply, forests, soil, marshes, wetlands harbours, rivers, and other waters and a conservation plan that systematically analyses the impact of each component of the master plan on the present and future preservation, conservation and utilization of these resources.

Unfortunately, under this Act, **planning/preparation of local level master plans is optional and not mandatory**. In addition, the Act does not specifically state that any proposed zoning should be enacted in accordance with a comprehensive plan. These shortcomings increase the confusion between comprehensive land use planning and zoning. This is the reason why the DC regulations are almost the same all over Mumbai.

Compartmental development by different sectors tends to result in uneconomic utilization of scarce capital resources. For example, development of industrial areas without essential township facilities, or the growth of housing colonies without any neighbourhood facilities like schools, health centres and shops. Various bodies responsible for development like the Railways, Maharashtra Industrial Development Corporation, the Maharashtra Housing Board, etc. have their plans for expansion of existing facilities or creating new facilities, which need to be co-related to a single perspective plan so that in the ultimate picture of development they are neatly dovetailed into their respective places. This kind of co-relation and co-ordination in activities and functions, especially in such ecologically sensitive areas with complex environmental issues, is possible only through comprehensive development plans.

A Basis for an Alternative Spatial Planning Process

Attitudes and perceptions of the environment expressed in town planning since Renaissance have, with some expceptions, been more concerned with Utopian ideals than with natural process as determinants of urban form.In addition to this the recent adoption of an international style of township design for residential developments all over has little to do with the inherent characteristis of the place.It is established and maintained in isolation,with little regard to the natural processes of the region ,a predetermined design is simply imposed on its site.For instance certain lands in a region that have been determined to be the primary ground water recharge areas for a stream or an underground aquifer as per the regional and zonal master plans should be specifically and delineated on the plot demarcated for the township design along with a prohibition on their disturbance or overlay with any kind of impervious surface.In the absence of the overall ecological base map for the regions the ‘site by site’ evaluation provided by experts during the mandatory environment impact assessement report for each large scale

projects would prove to be a futile mathematical exercise.Such site by site scientific investigations do not effectively reveal the cumulative impacts of this disaggregated type of land development and hence the post development conditions persistently differ from the expert predictions.

There must be a greater reliance on the preservation of complete ecosystems and less reliance on the attempts to mitigate the damage we have done to them.The traditional storm water drainage systems,the conventional method of solving the problem of keeping the city's paved surfaces free of water, have until recently been unquestioned.Sewerage disposal systems are seen as an engineering rather than a biological solution to the ultimate larger problem of eutrophication of major water bodies and wasted resources.

The resolution of these contradictions and the alternatives for design must be found in an ecological view that encompass the total urban landscape.The ecological values have been best summed up by George Perkins March in his book *Man and Nature*.

Conclusion :

An environmental view of the city is an essential component of urban planning that has long been ignored. Diversity is ecologically and socially necessary to the health and quality of urban life. Most of the mind boggling environmental problems that now confront us are in reality land use and planning problems. Both the case studies clearly demonstrate the fact that the disruption of the ecological equilibrium is due to the planning practice of zoning regulations which is not further deliberated upon through the provision of Comprehensive land use planning at zonal level. The focus of ecology can be global and generalised or local and very specific, but in either case the common unit of study is called an ecosystem. Whether large scale or small, ecosystems all have common characteristics that are of critical importance to local planners. There is an urgent need for an alternative basis for land use planning and urban form that is in tune with the natural processes of the region in order to ensure sustainable development

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