Urban Environmental System

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Nature, humans, technology, and the city

For most of history, humans have lived 'inside' natural systems, forming a part of the web of life (and of non-life) that constitutes our ecosphere. The exploitation of technology (especially the use of fossil fuels) in the last two centuries changed this pattern. The relationship between humans and nature became distanced. Technology was – and is – used to exploit nature and thus, from an anthropocentric point-of-view, to serve humans. Exploitation levels have reached a stage where we run the risk of overloading natural systems towards collapse: by harvesting far more than what is produced and by wasting far more than what can be absorbed. As a species, we seem to be writing our own epitaph.

The imperial city too was a human invention that flourished by exploiting various hinterlands, including 'inter'-lands -- a contradiction to the concept of sustainability! Today's nation-states have overtly diffused the structure but the core dynamic remains unchanged. Control prevails. The city seems viable only through escalating exploitation of either: the internal proletariat, the external proletariat (both mostly human) or nature (both renewable and fossil).

Cities colonize the hinterland: they consume food and water essentially produced by the rural areas. In return, they protect and provide certain products and services to rural areas: products and services that are increasingly unnecessary to produce in the city; products and services that seem to only exist due to a dependence on large amounts of fossil fuel and in many cases, notional wealth.

In the last few decades, partly by necessity and partly by choice, the nature of exchanges of material, energy and information between urban humans and nature has started reverting – slowly and grudgingly – to a symbiotic one.

It is easy to forget that one of the earliest and most complex technologies evolved by human societies for pushing nature in the role of the exploited is the invention of the city. In the last two centuries, we have tended to make the city in the image of a machine, an artifact to provide comforts to human beings. Therefore, just as we love images of powerful fast cars, we glorify images of the grand and the picturesque in our cities.

This mindset, as well as the break of individuals from the land that urbanity implies, has made us forget that the city is a living system: more like a pet or a friend of human society with its own personality, needs and complexities, rather than a machine.

A sample list of problems that are created by the 'urban' mindset is given below.

- Loss of land: agriculturally valuable and ecologically sensitive land
- Depletion of water resources: both for the city as well as for rural areas
- Increasing pollution of water (sewage, industrial effluents), air (vehicular emissions, high energy use, industrial effluents), and land (waste dumping)
- Increased costs of maintaining the same living standards
- Deterioration of rural areas (land degradation) and of urban areas (slums)
- Breakdown of the community

- Increasing use of energy embodied in building materials and industrial products
- Instead of the imagined grandeur, concrete jungles
- Conventionally, the techniques employed to approach the planning of settlements are:
- Formal (balance, symmetry, elegance, grandeur, ‘picturesqueness’)
- Economic (employment, costs, viability)
- Planning (density and land use, circulation, services)

However, in response to the problems mentioned, we must now include concerns that go beyond these, such as:
- Human values (participation, community)
- Nature and technology (water-waste, energy-ecology, materials-maintenance)

What would constitute a viable, sustainable urban environmental system? Can there be an ecotopia: ‘rurban’ networks with ‘dematerialization’ and decentralized renewable operations not dependent on mass production, bulk transport, or fossil fuels? Can urban populations in the poorest of countries be provided food, water and energy commensurate with an acceptable lifestyle without creating unsustainable ecological footprints? Can they be sufficiently employed, mobile and can such systems be governed?

As a sample, these are some strategies to reverse the extremely large ecological footprint that our current settlement planning creates and then happily ignores.
Water security can be achieved by:
- Grow your own: Harvesting at all scales, from the plateau and roofs
- Store a lot: in ponds, tanks and aquifers, because renewable yields are diurnal and seasonal
- Use less: by conservation and efficient use
- Transport less: and over shorter distances, by decentralization
- Build two-way networks: recycling white, gray, black, and green water; every consumer is also a producer
- Exchange using information networks to enable real-time trade as per need

This works for other resources like food and energy, too

This unit shall concentrate on sustainable urban environmental systems, for example:
- Water recycling and rationalization of use
- Rain harvesting at the urban scale
- District energy systems
- Recycling and treatment of urban waste
- Urban agriculture
- Sustainable urban transport
- Infrastructure

Holistic, cradle-to-grave types of research and analysis papers shall be preferred, especially in the area of energy (electrical and thermal), water and food, wastes, mobility, infrastructure, material resources and their throughput, reduction, reuse and recycling. This unit shall concentrate upon dynamic balances and closing of the loops. It would not be so much about technology as about integrated systems. While the thrust is on ecological planning and design at the city scale, issues of policy, land use control, transitions and ‘governability’, and participation could be brought in (indeed would be encouraged) where they are integral to the systems described.

Depending on the entries received, the three sessions shall be segregated either by technologies (water and food, energy and mobility, work and governance), or this arrangement could be according to three types of approaches as listed below:

- Metabolism – Practical examples of the modeling of material/energy balance at the urban scale
- Systems – Designs for holistically addressing the urban environmental problematique
- Cases – Examples of development and case studies of innovative multiple energy and environment or infrastructure systems