Design with Nature

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I am deeply grateful to the Japan Prize Selection Committee of the Science and Technology Foundation of Japan for the high honor they have accorded my discipline and to me. The selection of City Planning as a subject worthy of such a prestigious award is at once original and beneficial. It does, indeed, justify your concern.

There is an unhappy confluence of events, increasing world population, often vested in mega cities of thirty million, the global peaking of petroleum production imminent, and global warming, which has enhanced the frequency and ferocity of natural hazards—hurricanes, tsunamis, typhoons, tornadoes, floods, and perhaps even earthquakes and volcanism as an enlarged global population competes for declining resources.

This has posed a new urgency for understanding natural processes and practicing preservation, protection, and mitigation—in a word, planning—to protect human health and welfare and the environment.

There is yet one additional challenge, that is, the prospect that global oil production is very near to its peak now and that shortly we will see a declining resource, increasingly expensive to extract, becoming scarcer, the major source of competition for sparse resources, the dire implications are for the agriculture in developing countries, the claims for transportation, and the employment of oil for industrial and commercial uses. Petroleum's future may well be the major agent to arrest growing mega cities and induce populations to revert to rural environments and subsistence agriculture, responding to the choice of "farm" or "starve".

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The decline in world oil production must stimulate responses to counter the pain and suffering that will ensue. There should be a global commitment now to alternative energies —including micro hydro, geothermal, photo voltaic, active and passive solar, wind machines, fuel cells, methane digesters and micro turbines. In particular, the challenge of providing transportation, in the absence of cheap petroleum, should stimulate the design of electric vehicles, the use of hydrogen as a prospective fuel and, above all, a vastly increased economy in resource utilization.

My contribution to this profession has been to advocate the inclusion of environmental factors to supplement socio-economic parameters. In particular, using computers and GIS, I emphasize meteorology, physical oceanography, geology, hydrology, soils science, plant and animal ecology, limnology, and marine biology with ecology as the unifying discipline. These factors can be integrated with ecological models and interpreted for human use.

Towards this end, with a large grant from the Ford Foundation, I hired a faculty including all of the environmental sciences. The next business was to urge this group to cooperate in the creation of integrated biophysical models of the region under study, notably river basins and metropolitan regions.

The instrument that was most efficacious was chronology. I advocated the creation of a layer-cake simulation employing time as the unifying device. The oldest evidence is usually geological; these data, with meteorological processes, provide understanding of geomorphology and ground water hydrology. Subsequently, these data can inform surficial hydrology. Following geology, geomorphology, and ground and surface hydrology is the "layer" of soils. When these are added, vegetative structure emerges, and, subsequently, so does wildlife ecology.

Later, with funding from the National Institute of Mental Health, social science was incorporated. Ethology introduced the subject of behavior, ethnography the practices of

"primitive" peoples, and cultural anthropology that of "advanced" societies. The addition of epidemiology brought in climate, rocks, soils, plants and animals, viewed from their impact on human health and well being. Also included were a resource economist and a geographer—computer scientist.

An ethnographic history will reveal constituent groups, with characteristic values, settlement patterns, employment and land uses. This same ethnographic study can be employed to ascertain critical issues and attitudes to these, which, when concluded for all constituencies in the region, will permit planning to proceed.

Here the opportunities and constraints of the environment are seen as suitable or unsuitable for all prospective land uses. A successful plan will match needs and desires with opportunities and constraints to provide guidance for "fitting" allocation. Fit environments will be those that provide the greatest number of user needs with the least work of adaptation and least depletion of non-renewable resources.

Increased oil prices will elevate the cost of industrial materials, particularly iron, steel, aluminum and glass. This will affect current architecture, which emphasizes high tech expressions, notably in Jakarta, Singapore, Taipei, Tokyo and San Paolo. This choice is in direct conflict with materials cost. Natural materials—clay, brick, stone, adobe, and wood —while not fashionable are, at once, renewable, economic, and preferable.

The imperative aim of increasing carbon fixing to reduce the incidence of atmospheric greenhouse gases would emphasize protecting those great areas where carbon is being fixed now—tropical and temperate rain forests, estuaries, and coral reefs. It would also emphasize tree planting on a global scale, re-establishing forestation lost over the last century of industrialization.

It may well be that the most direct address to the manifold problems we are and will confront is to address the challenge to undertake a global ecological inventory. The largest assembly of equipment, hard and software, exists in the military, where it was assembled for the purpose of conducting nuclear war. In this, massive data sets were assembled for Asia, Europe and North America by the two major protagonists. There is, therefore, time series data on all of the major fields available for use now. The sensors and computers should be employed to provide a global inventory and charged to keep it current and to employ it for all planning problems. An environmental impact statement should be required analysis for all projects.

This necessity for a global ecological inventory as the database for all planning decisions holds implications for planning itself. It should become regional, national and global rather than as it is today more usually parochial. In historical reference, the proposed planning should equate with the TVA, or better, the Marshall Plan, perhaps the most successful planning accomplishment of the 20th century.

Japan has a long and far-reaching cultural history of preoccupation with nature expressed in language, poetry, art, and, not least, in the sublime creations of gardens and garden art: Ryoanji, Saihoji, Itsukushima, Ise, Katsura, and more.

This legacy should be rediscovered, cherished and employed to create a better harmony of man and nature, the face of nature in the city of man; not only in Japan, but in cities around the world.

May the Japan Prize Committee, by its selection of City Planning, give prominence to this crucial activity and point the world towards planning the future.