

highly. However, measures to combat desertification and contend with overpopulation and other basic problems are perceived as inadequate. There has also been little progress made in changing economic systems to effect greater environmental conservation, or in establishing the necessary capital-creating mechanisms for the preservation of the environment.

Large differences can be seen between respondents from developing and developed countries regarding what is most important for solving environmental problems. The former focused on overpopulation, agriculture, and education, while the latter focused on changes in lifestyles and economic systems.

4. Perceptions of Global Warming and Effective Countermeasures:— The problem of global warming was regarded most seriously by Oceania, which includes many island nations, and least seriously by Japan.

The measure that was judged to be the most effective in dealing with global warming was the development and promotion of recyclable energy resources. Among respondents from developed countries, support for systematic measures such as the introduction of environmental taxes was strong.

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The Linear City

The idea of the Linear City results from ten years of study following which a close look will make you realize that it could offer several solutions to the ecological and sociological problems of our times of ever-increasing population-pressures. Moreover, the Linear City aims at increasing the quality of life by bringing the countryside to the City and does so through a realistic and affordable transition. The world is currently faced with the fact that thousands of millions of people need a place to live on a limited planet governed by ecological laws. On the one hand, cities offer the concentration needed for work, services, and the leisure that makes them appealing but, on the other hand, the suburbs and the countryside offer the tranquility and the beauty of Nature that is just as needed by most. The following architectural probing is aimed at finding a solution that would blend the two lifestyles by making cities with versatile public transportation more efficient than personal cars that currently are a major source of noise and pollution.

Origins and Solutions

This way cities are built goes back to the beginning of civilization, and even though they evolved to some extent to adapt themselves to new needs, the principle stayed the same: to provide means of transportation and a network to link different locations (home, workplaces, services, etc.). This has led to huge, noisy and polluted cities that are often not at all aesthetic. They became surrounded by suburbs because people were looking for a lifestyle that a city could no longer offer. Suburbs have spread over large areas and become farther and farther away from the city where people commute every day. This requires miles and miles of highways and roads, and they are still expanding.

It is not possible to house numerous millions of people in this way without running into serious ecological problems. However, it is technologically feasible to reduce considerably the inhabited area, to improve the quality of life, and to be ecologically correct, while also reducing considerably the cost of living.

Cities offer the concentration needed for work, services, and leisure that makes them appealing; but on the other hand, the suburbs and the countryside offer the tranquility and the beauty of Nature that is just as needed by most people. As already indicated, our architectural research aimed at finding a solution that would blend the two lifestyles by making cities with a versatile public transportation more efficient than personal cars which are a source of noise and pollution.

This solution is the Linear City built in height and linearly. Architectural variations are added to modules set up at half-landings. Three transportation systems are inserted in three underground levels: they are superposed one on the other and connected. By being linear, this network is simpler and more efficient than current arrangements, and at the same time the city is located next to the countryside (see Fig. 1).

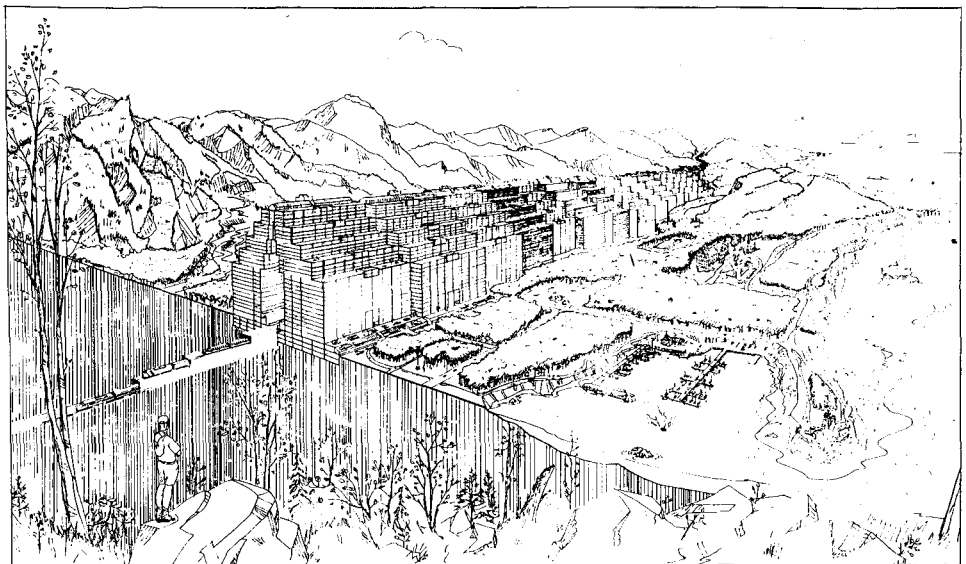


FIG. 1. Linear city in a country setting.

Each dwelling has a large private terrace and has a view that only a national park can offer, at least in a populated area. It has an arrangement, a characteristic surface, or a distinct configuration, while sharing a larger terrace where a swimming pool, a small park, and a playground for children, could be established. This altogether would constitute a small community of about one hundred people, thereby creating a social life that could alleviate the loneliness of our modern cities.

Each floor has facilities such as mailboxes, fire-stations, workshops, storage places, vending machines, and separate garbage drops to facilitate recycling (paper, glass, metal, etc.).

The height of each mixed residential-commercial module can go from 12 to 32 floors. A residential one has 12 to 16 floors and is set up in half-landings. A commercial area is located on the lower floors, the height of which can be changed as needed. This could cause the height of the linear city to vary with a mountain chain. The residential area of 16 floors will overhang any commercial area (*cf.* Fig. 1).

When present, the commercial area will have stores and boutiques located on the main floor while offices and factories will be on the upper floors, making it then possible for someone to live right above his workplace. This may be found advantageous for some; such proximity makes it possible to work partly at home, to take care of the children or just to break the day and go home and relax a little.

Modules Advantageous for Town or City Grouping

A module regroups 8 half-landings and accommodates 800 residents with associated workers on the commercial floors. Inside, one will find stores and services and on the roof, a neighborhood park with a bar and restaurant, playgrounds, a children's play-suite, saunas, a belvedere, picnic and sun-bathing areas, and a shaded retreat. This roof, set-up as a terrace with its activities, will bring the sociological advantages of having the impression of belonging to a community — somewhat as living in a village — while all the commodities of the city are still easily in reach. Footpaths will link the different roofs to one another, while inside halls and alley-ways will link the modules as well. Storage places and public workshops are also provided, and a sports' centre with natural lighting will be located on the first underground floor which will have a direct access to the outside.

Landscaping around the building will be set up for the needs of outside activities such as cycle-tracks, parks and footpaths, horse riding, gardening, and different sporting facilities. Historical locations will be preserved, and buildings provided for activities that the linear city cannot accommodate (*e.g.* stadiums) will also be located outside, in the immediate surroundings. A separate document accompanying the Linear City plans describes in detail the city and its components.

A group of 7 modules could offer the services that its population can justify: a metro station, sporting facilities, parks, stores, etc. A group of more modules would require the services of a small town: this includes train and metro stations, education facilities, cultural services, hospital, etc. Finally, for each 2 million human inhabitants, services found in cities would be provided (*e.g.* high-speed train station, airport, etc.).

Its public transportation for freight and passengers is set up on three underground levels that are connected and

superposed. The three levels will be, respectively, for short (metro), medium (train), and long (high-speed trains), distances. Small electric vehicles and trolleys will be made available for rental, so that the transport should be as convenient as it is now with a car. Rapid and easy access of these vehicles will be set up in train wagons and elevators. Switching points and siding for train wagons will rapidly convey goods without slowing down circulation.

As it uses very little space, the Linear City should be located in the most interesting areas of a country that are often currently occupied by national roads. The city will be built on the outskirts of present cities and can expand slowly towards the centre of the city which may then decay and be abandoned, though the most interesting buildings should be preserved for historical reasons. In the beginning, the three underground levels for the public's transportation will be roads used by cars. But as the Linear City evolves, public transportation will be installed as planned. As they are located beneath the buildings, these underground highways will link easily and rapidly the Linear City to the old city. By implementing it in this way, the development of the Linear City will be promoted and when the number of its inhabitants will justify it, the highways will be replaced by a metro, a slow train, and a high-speed train.

To provide an average home of 40 square metres, a workplace, services, roads, and facilities for different type of activities, an American metropolis with its suburbs uses 500 to 700 square metres of land per inhabitant. The Paris area in France uses 300 square metres and the São Paulo area in Brazil some 175 square metres. With the Linear City, only 20 square metres of land will be needed to provide exactly the same services: this can make for a reduction of up to 97%. Moreover, this offers a more interesting and comfortable environment for all, and addresses many ecological issues.

Potentials of the Linear City

According to the United Nations' projections, the population will go from its actual 5 thousand millions to 6.2 thousand millions in the year 2000 and to more than 8.5 thousand millions in AD 2025. The World Health Organization figures that 51% of the world population will be living in cities in the year 2000 and 61% in 2025. It must not be forgotten also that the third world countries are also understandably aspiring to a quality of life that could compare with that of the industrial countries.

By just guaranteeing loans, the governments could act as the promoters of the Linear City and make a big profit without having to spend much money. This comes from the fact that they are the owners of the lands over which highways and roads are built, and it is this land that would be used to build the city. Through an association with the private sector, they would not have to build and manage the latter: this would be left to the private sector that is more efficient in managing such projects as this. The profit would come from selling the buildings as co-properties, and it could help in reducing the national debt. This project is based on a smooth transition that would help the economy of the country over many years while responding to real needs. This stimulus could be more important than the one that occurred in 1945, due to the need of rebuilding after the Second World War.

The structure and many elements of the Linear City are repetitive, and this would bring the cost down because they

could be mass-produced. Building materials and manpower are provided by the country itself and therefore would not create a commercial imbalance. Public transportation would reduce, to next to nothing, the needs for oil and cars. The regrouping of habitations would considerably reduce the cost for heating and air-conditioning. The linearity of the city would help in reducing the cost of numerous goods and services. One can think of the roads and their maintenance, of course, but also complex networks of distribution for natural gas, electricity, sewers, cable, and telephone, mail, etc. Industries would also find it easier for their installations and the distribution of their products. The cost of governmental services would also be reduced with linearity and this would reduce the taxes.

On the ecological side, the lesser oil consumption would certainly help a great deal in reducing the 'greenhouse' effect while preserving this limited resource. A scientific conference held in Toronto in 1988 issued the recommendation of a 20% reduction of all carbon emissions by the year 2005. The substantial reduction in the use of land would reduce imposition on the food-chain, reduce the desertification and other loss of agricultural lands, and improve the oxygenation of the planet. The selective garbage collection of recyclable materials could be simplified easily by different drops linked to wagons that would be directly brought to the recycling plant.

As for our current industrial parks, industrial activities would be regrouped close to the public transportation system, to set them apart from the residential areas. Their access to their markets and specialized workers would be improved, so that virtually no land would be needed for parking. This regrouping in height and on the ground would make it possible for industries to share common services. For instance, they could reduce their sources of pollution by having common filtration systems for smokestacks and used waters. This proximity between industries would greatly facilitate communications, while taking into account current technologies and other relevant factors; nevertheless some planning would be needed to bring together those who collaborate the most with one another.

Improving Security and Life

Security would also be improved, due to the links between buildings that would facilitate the evacuation of high-rise buildings in case of fire. A central surveillance for each module would have cameras installed at strategic points to insure prompt seeking of help. For its arrival underground roads would be reserved for emergency services. An integrated fire-fighting system, combined with a fireproof construction, would considerably reduce the damage and any loss of lives caused by fire. The public transportation system would make car accidents practically a thing of the past.

The plans and documents describing this project only give information about the architectural side of it by describing its functioning, the dimensions, and an analysis of the main elements. Much room has been left to allow for differences in the frontages, the inner halls and parks, apartments, and public buildings out of the city. It is best to leave that to the local governments and communities to offer the pleasantness of diversity. The reduction in built areas should justify architecture of high quality and could even increase the need for architects who are not accustomed to public employment nowadays. It goes without question that it is also important to keep those buildings that have architectural or historical values.

I strongly believe that the Linear City brings an interesting and realistic solution to problems that our society has to address, and more and more drastically as time goes on. Gradually, our present cities will be replaced by others that should be more suitable for the present and future needs of humanity. Certain countries must build new housing urgently to answer those needs. If we do not want to leave irreversible situations to future generations but instead a better world, a remedial project such as the Linear City must be started as soon as possible.

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Tourism Development in Bay of Bengal Islands: Problems and Prospects

The Andaman and Nicobar Islands, a Union Territory of India, are situated in the Bay of Bengal at 6° to 14°N and 92° to 94°E. They comprise a total of 572 islands, islets, and rocks; have a total geographical area of 8,293 sq. km and total coastline of 1,962 km; and are 1,200 km away from the Indian mainland. Moreover, Nature has endowed these humid tropical islands with one of the world's richest ecocomplexes of forest, mangrove, and marine vegetation complexes.

Long isolation and undisturbed ecology favoured the development of unique insular fauna (5,300 species of major animals) and flora (1,500 species of angiosperms) and has harboured irreplaceable gene-pools of many interesting endemic animals and plants, confining them to some specified areas with Indo-Chinese and Indo-Malayan elements.

The islands are still also the home of primitive aboriginal tribal people belonging to the Nigrito (four) and Mangolian (two) races. Ross Island — a ruined complex and settlement, Viper Island — gallows and jail (Mount Harriet, Cellular jail — a national memorial) are historical relics of about 100 years (1858–1947) of occupation of the British regime; there is also a Shinto Shrine built during the Japanese occupation of 1942–45.

The natural, tribal, and historical, heritage offer tremendous scope for Nature and adventure tourism in these islands. The Andaman and Nicobar Administration, after the declaration of 'tourism' as an industry in 1987, initiated tourism development with the Ministry of Tourism as the nodal authority to cope with foreign currency and to generate employment, particularly in 1993.

Andaman Water Sports Complex, Mini Disney Land cum Amusement Park, Sound and Light show, adventure tourism facilities, accommodation (1,380 beds), beautification of the capital city Port Blair, and tourism festival in February, are the latest developments. To boost tourism during 1995–96, many islands are being opened for foreign tourists and planned funds are doubled to complete the projects of marine aquarium cum dolphinarium, setting of golf course, purchasing house boats, speed boats, A/C coaches, providing more accommodation, and extension of the runway of the present airport to link these islands with nearby South-East-Asian countries.

Environmental degradation started in 1858 with the penal settlement and was sustained until 1947. The post-independent schemes of settlements, immigration, agriculture, agroforestry, wood-based industries, etc., intensified in the recent past and had seriously affected the fragile and sensitive ecocomplexes of these islands.