# Ecumenopolis: The coming world-city

*The text that follows is a slightly edited version of a combination of texts by C.A. Doxiadis which first appeared in* Cities of Destiny *(ed. by Arnold Toynbee) (London, Thames and Hudson, 1967), pp. 336-358; and* Ecumenopolis, The Settlement of the Future, *ACE Publication Series, Research Report no. 1 (Athens, Athens Center of Ekistics, 1967), pp. 157-164.*

## Introduction

Man has been living for thousands of years either in villages or in small static cities. Cities were always static; the symbol of their static nature was the wall. Walls did not exist merely in physical form; they were the most symbolic feature of the city for thousands of years. This can be understood by the fact that where there was no necessity for walls, for example, in the Spanish colonial cities which were created on the basis of well-conceived plans, the city walls which had so strongly influenced man were replaced by wide, well-planted avenues which did not present any hindrance to invaders, but nonetheless provided the inhabitants with those city limits which their predecessors had maintained for thousands of years.

It can be argued that several cities in the past were not static at all. Athens, for instance, underwent an important expansion under the Emperor Hadrian, and Constantinople moved its walls under the Emperor Justinian in order to cover a wider area (figs. 1 and 2).

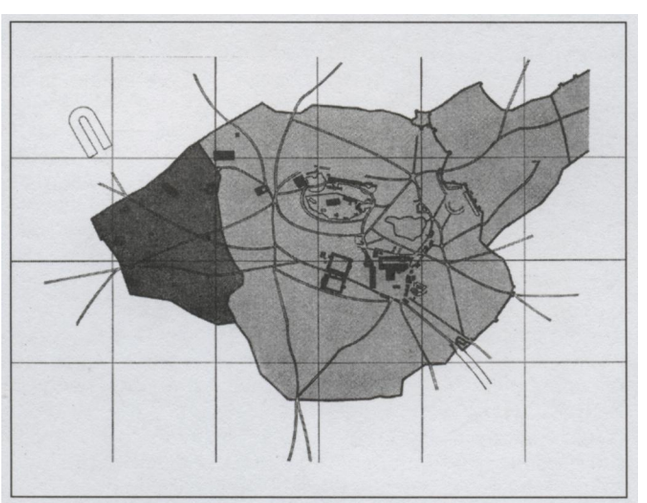


**Fig. 1:** Athens, example of a revision of dimensions at a particular historical moment – The darker area shows the expansion under the Emperor Hadrian. (*Source:* After a drawing by J. Travlos).

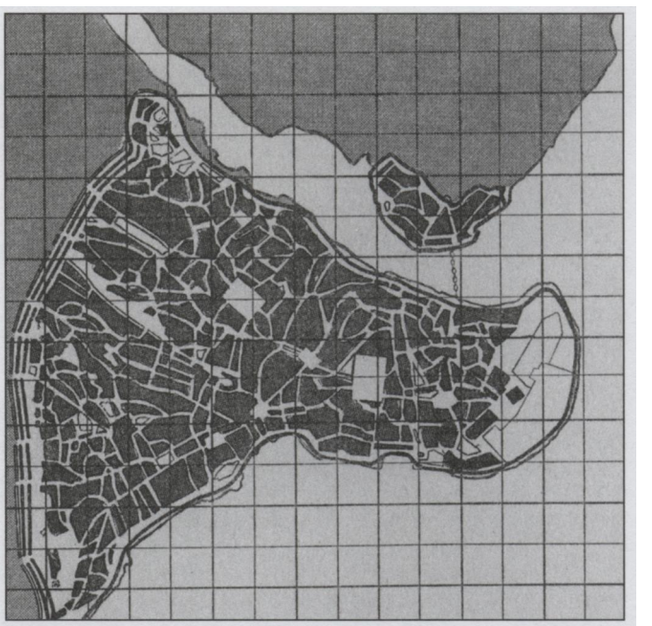


**Fig. 2:** Constantinople in the 5th century, showing the double walls.

But these very examples confirm the theory of the existence of the static city. In both these cases, as in others, the city was not growing continuously in a dynamic way, but was simply revising the dimensions of its static nature at a particular critical historical moment, when its functions or its importance were changing.

The cities were also small. They ranged from a few thousand to scores of thousands of inhabitants. There were some larger cities like Alexandria and Rome, Constantinople and Peking, which contained hundreds of thousands of people, but these cities were quite exceptional and they did not maintain for very long such large populations. The overwhelming majority of the cities of the old civilizations, down to the seventeenth century, were small, with less than 100,000 inhabitants. It is quite characteristic that in the ancient Greek world, which created the famous city-states, the largest cities comprised only about 50,000 people; and such a famous cultural centre as Athens probably contained no more than 35-50,000 people. A comparative study of the populations of several Greek cities shows that their average population was below 28,000.

In these cities, the elements from which they were formed – the natural setting in which they were built, the man and society for whom they were built, their functions, and finally their

physical structure, the shell – were all in balance. The inhabitants of these cities must have been happy in them, for they did not attempt to change their basic characteristics for thousands of years.

The physical dimensions of the city of the past, with few exceptions, were such that man could easily comprehend the whole, and could easily walk from one end to the centre in less than fifteen minutes. The structure of the city was simple: one main centre or, in the larger cities, one important centre and others of secondary importance. The central administration was responsible for all aspects of life. This administration was in most cases in charge of the whole area. In other cases there were also some small local administrative units, which were really only subordinate branches of the central city administration.

The city of the past, apart from being static and small, had a definite simple structure which allowed man, as an inhabitant, to comprehend it easily, to move without difficulty in a way that served all his needs, and to administer it properly.

## Dynamic evolution

On several occasions in this long history, several cities broke their walls and spread out into the countryside, but they have not survived. Those which survived were the typical static cities. It was only in the seventeenth century that cities began to break their way out and still survive. This change, which coincides in date with the beginning of the scientific revolution, is related to the increase in population and to the new technology, both of peace and of war.

The construction of the first railway systems facilitated a much greater urban expansion. Several urban areas began, in the nineteenth century, to grow continuously at a rate which had no relation to the growth of the past. At the beginning of the twentieth century the introduction of the automobile produced a much wider spread of the urban tissue into the countryside.

The evolution of the several types of human settlements can be understood if we follow the patterns of the same area in different periods. First the villages, then the static city, then the dynamic city under the impact of the railway and car, and, finally, the present urban area. From the village through the city, we move to the Dynapolis, to the Metropolis, Dynametropolis, Megalopolis and, at present, the Dynamegalopolis (figs. 3 and 4).

The cause of this urban way of life was the great increase in population. We can easily understand this change if we follow the rate of growth of the population of the earth and of the urban population of the earth. How this influences the city can be seen from the curve of the evolution of the population of the city of Athens, which for three thousand years had under 50,000 people, and then, within a single century, broke the barrier and has today reached the level of two million people.

The result of this population explosion was a great change in the physical dimensions of the city. The walls broke, and the city spread in all directions. The small cities of the past turned into the huge cities of the present.

In these cities, we completely lose the human scale. Man is unable to comprehend the whole. He cannot even see the city from end to end. He cannot understand how to move in it because, while the local areas have identical features, the totality makes no sense for him; he cannot find his way. More than anything, the dimensions have become non-human. Man can no longer walk from his home to the centre of the contemporary city. The example of Athens, where we can compare the dimensions of the city of the past with the city of the present (and Athens is not one of the largest cities in the present-day world), is characteristic of the change in the relationship between man and the city. Such a city has not just

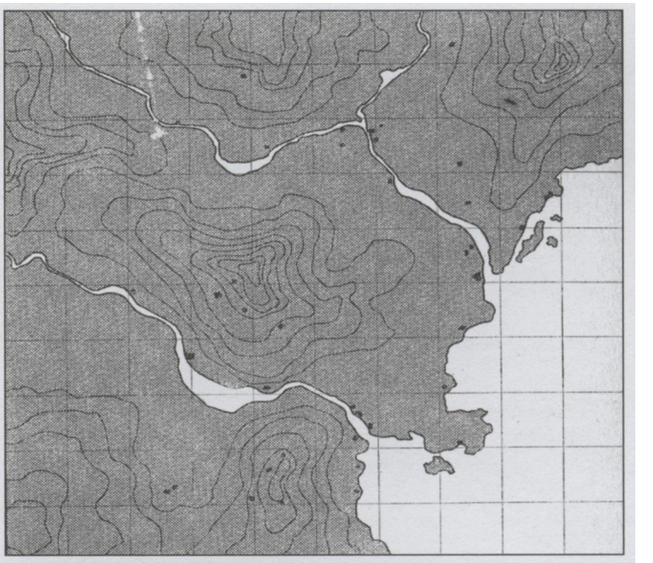


**Fig. 3:** Stages in the development of the city: Villages in the pre-urban era.

one centre, but many centres; not just one authority, but many authorities. It is no longer easy for man to comprehend, to live in, or to administer the contemporary city, because it has grown out of the human scale, grown out of control. What is more, it is continuously changing.

Actually, the contemporary city is no longer small, static, or comprehensible for the common man. It is a dynamic city. Athens, for example, is growing by 13.5 dwellings an hour. Contemporary cities are dynamic cities or Dynapolises, and very often they are systems of cities growing dynamically, Dynametropolises, and tending to be Dynamegalopolises. Thus, cities which remain small and static are no longer contemporary. This can be understood if we recollect that, although man has created and lived in cities for thousands of years, there are still villages which survive in the era of cities. In the same way, we can see several cities surviving in the era of Dynapolises. New types of human settlements do not eliminate the previous ones. They simply absorb the greatest part of the additional population.

## The irrational city

The dynamic city which we have created today does not function properly. We only have to think of its five elements in order to see how irrational it is. Nature is spoiled with every passing day. Man finds himself in surroundings which are out of his direct control. Society is destroying the values that it has established in the past, without yet creating a system of values to replace the former ones and to give equivalent satisfaction to man. Functions are not operating properly; we need only realize that the greatest traffic volume is in the centre of the city, where we have the narrowest streets, in order to understand how irrationally we try to solve the problems of specific functions. Finally, the shell of the city is disintegrating; we do not have beautiful contemporary cities. When we talk about them it is only to veil the fact that we are changing them every day for the worse.

This irrational situation can be better understood if we think of the centres of our cities. We allow our cities to grow all round their centres, and they are being choked to death. Is it reasonable to expect a small child to survive if we surround its heart with a steel frame? It will die. The same thing happens with our cities, the centres of which are surrounded by

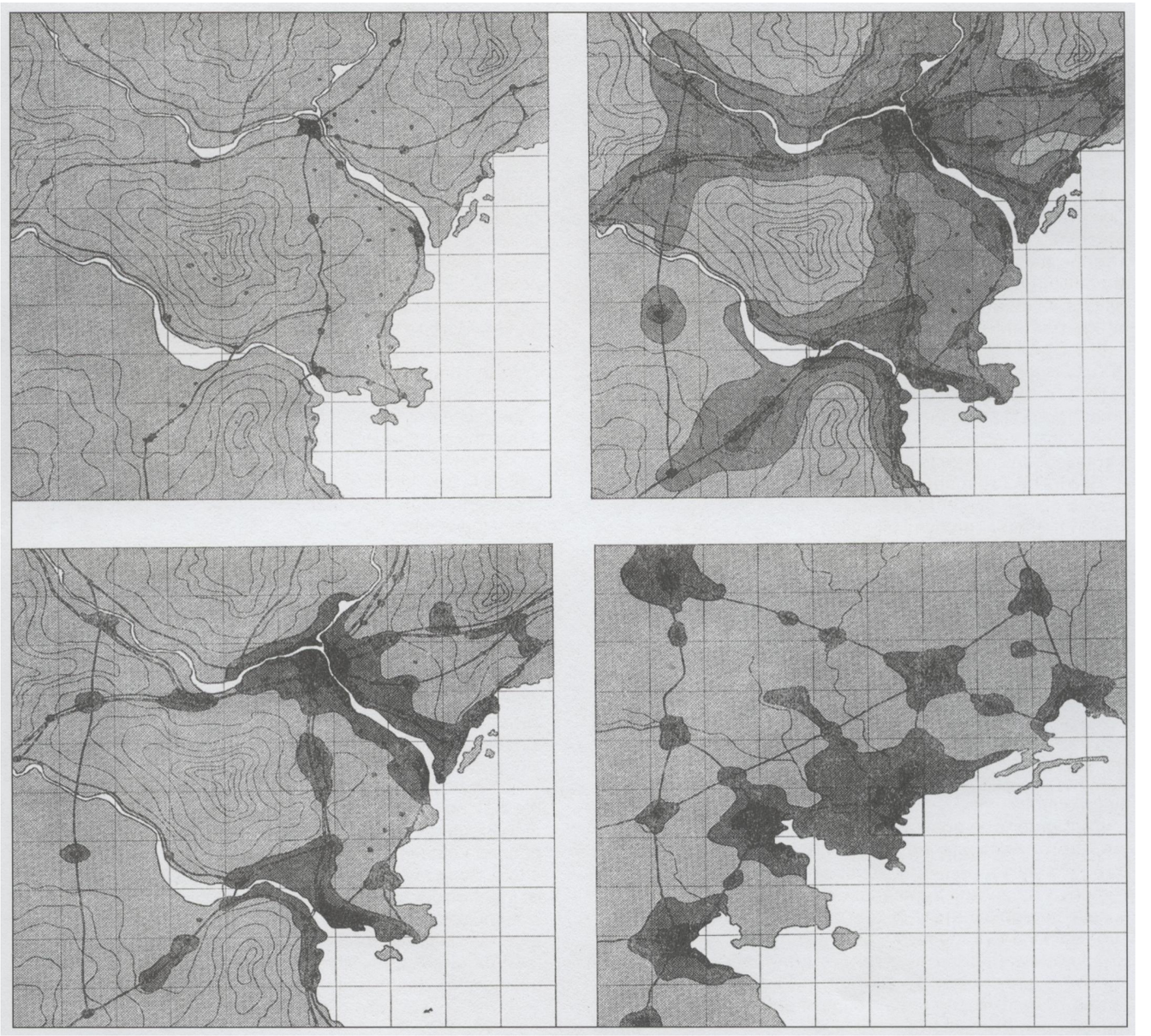


**Fig. 4:** Stages in the development of the city: City-states in the urban era (top left); Cities as Dynapolis in the industrial and railroad era (top right); Metropolis in the motorcar era (above left); and Megalopolis, the beginning of a new era (above right).

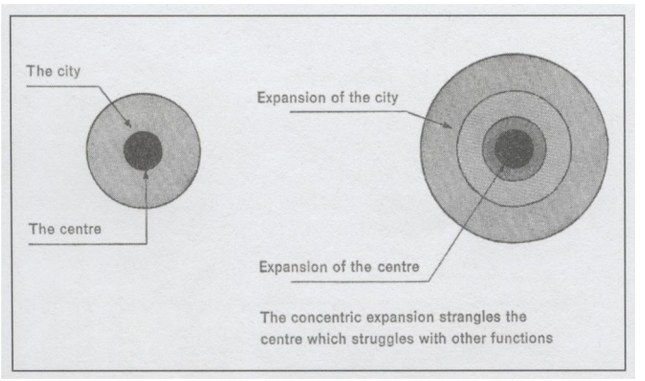



**Fig. 5:** The static city. By the time problems of urban renewal have been solved at the centre, a new ring of problems around the previous one has been formed.

built-up areas, with the highest investment in the biggest buildings; and still we let our cities grow (fig. 5).

Distances are growing irrationally in the present-day city. We could even say that man has found himself in the following unreasonable situation; he is creating machines which can run at a higher speed, but he finds himself at longer distances from the centre of his cities. The speedier his machines, the longer it takes man to travel to the centre of his city. The very fact that today we cross the large metropolitan areas at an average speed of 15 kilometres an hour *by* car, that is at the same speed at which we were crossing them at the beginning of the century, when we were using horses and carts, shows the irrationality of the systems that we are developing.

Our failure is due to the fact that everything is changing continuously; and, in spite of the cities being dynamic, we try to solve their problems as if they were static. As we cannot

succeed in this, we continually revise our goals. We hear of cities with a maximum population of 2 million people which revise it to 3 million and 4 and 5, and so on, or we hear of cities which dream of surrounding themselves with a green coat, or green belt, in order not to grow, as if man could stop himself from putting on weight by wearing belts. Naturally they fail. The green belt of London is characteristic of these attempts.

In spite of these efforts and conceptions, we look upon the Dyna-polis as a static city. But there is no city in the world which has managed to stop population growth. So it is not strange that all our plans have been failures. Because of such failures, we are trying to ameliorate the present cities with urban renewal plans, but we are not achieving anything, as the rate at which the problems are increasing is higher than the rate at which we can solve them so long as we view the city statically.

Thus, by the time when we may have solved problems of urban renewal at the centre of the city, we have a new ring of problems around the previous centre, and the problems have increased. It is a vicious circle.

If we follow this road, there is no way out. Our cities cannot survive in their present form, yet in spite of that we add population to them. The dynamic cities of the present are being led towards their destruction.

## The future population increase

The most important characteristic of the city of the future is related to the increase in population. The present population of the earth exceeds 3 thousand million people. The rate of increase is growing. As things are at present, we should expect a continuing increase in the foreseeable future. There are, however, forces which are beginning to operate subconsciously (as we see in animal societies living in difficult situations) as well as consciously, such as the movements for birth-control.

What order of magnitude of population can we expect in the future? Because we are probably reaching a turning point, we cannot be certain at all. We must therefore satisfy ourselves by assuming a certain maximum and minimum. It is quite probable that the population of the earth is not going to be less than 12 thousand million people by the end of the twenty-first century. For, even if birth-control were to be imposed immediately on all nations, it would take a long period of time to implement such a policy, even if it was agreed upon at an international level. Thus, it has been estimated that we cannot expect a population of less than 12 thousand million people. However, it is much more probable that the minimum population will be of the order of 15 or 20 thousand million people.

Then what is the maximum? If we want to use the whole surface of the habitable earth, entirely for building a colossal world-city, then we shall have a population of 500 thousand million people. This means that the food will have to be imported from other planets. As this may not be reasonable, it is estimated that not more than one-fifth of the total area can be taken over for these human settlements, which means that 100 thousand million people is the maximum reasonable population for the earth. But the earth cannot feed so many people, even at the present technological level. Assuming a normal development of technology, we can expect the population of the earth to reach the figure of 50 thousand million people. Some experts speak of 100 thousand million people; but, on the lines on which we have assumed a reasonable minimum of 20 thousand million, it is now reasonable to assume a probable maximum of 50 thousand million people.

Such considerations lead to the assumption of several curves of the evolution of population, ranging from a minimum of 20 thousand million to a maximum of 50, and pointing to an average of 35 thousand million people, to be reached towards the end of the twenty-first century. However, such a figure should not mislead us into assuming that the total population of the earth will be ten times larger and no more. First, we do not know whether it will break that barrier; second, and more important, the problem of our concern in urban affairs is not the problem of total population, but the problem of urban population. As we cannot expect an increase in the rural population beyond the present level of about *z* thousand million people (increase in productivity is going to allow them to produce enough food and raw materials for the whole population), a total population of 3 5 thousand million people means an urban population of 3 3 thousand million people.

As the present urban population of the earth is of the order of one thousand million people, we have to understand that, if the growth of the population is spread uniformly round the earth, the average city of the future is going, towards the end of the next century, to have 3 3 times more people than it has now. We have only to think of traffic in this city in order to understand how irrational such growth can be if we do not study the whole situation more carefully.

# Dynamic change in the city

However, population growth is not the only dynamic change that we are going to witness in the city of the future. For, as a necessary condition for such growth in population, we shall witness a continuous increase of *per capita* income. Such an increase will proceed *pari passu* with the increase in the number of cars and other machines in use.

Thus, in order to understand the dynamic increase of the city of the future, we have to add all these forces together. When we have done that, we shall see that it is quite probable that the dynamic city is going to increase at a rate of more than 12 per cent per year. The population is increasing by 3 or 4 per cent per year, the *per capita* income is increasing by 4 to 5 per cent in the urban areas and, apart from that, there is a necessity for social programmes to catch up with the accumulated problems of the past; and we are going to have a greater increase of investment in the urban areas than in food production, for example, as gradually more and more people come to be adequately fed (fig. 6).

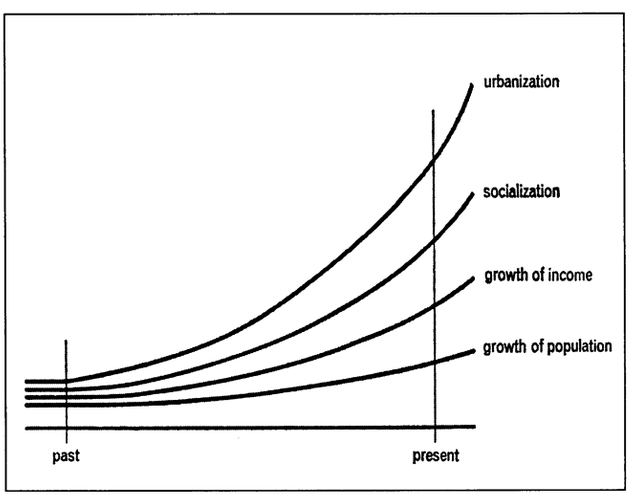



**Fig. 6:** It is probable that there will be a 12 percent increase of the dynamic city, a population increase of 3-4 percent yearly, a per capita increase of income of 4-5 percent.

Apart from this higher rate of the dynamic change of the city, we also have to realise that, in consequence of the growth of cities, we shall have added functions because of the change of the order of magnitude in the city centre. In a small city with few functions in the centre, growth will demand that these functions shall be supplied to the whole population of the city, and therefore centres of this order will have to be multiplied. But in addition to this, we shall need new centres to offer services of a higher order, such as centres for administering the pre-existing centres of a lower order. In this way we not only have a dynamic increase of the city, but also have a change in its very structure as well, through the addition of functions of a higher order.

With all these additional functions that we have witnessed up to the present and shall witness even more in the future, there will be lower densities in relation to the area. This looks quite strange, because we normally think of London as the London confined within the city walls which are filled with multi-storey buildings, or of New York as the city of skyscrapers. But if we think of our metropolitan areas as the great urban agglomerations which they are, we shall find that their densities are continuously diminishing because a much larger space is required for the fringe: residential areas for systems of transportation of a higher order and modern industries, shopping-centres, etc., which are expanding in area more than in height. The result can be seen in the very fact that, whereas in the ancient walled cities we had densities from 150 to 200 persons per hectare in the ancient Greek cities and of several hundred per hectare in other over-congested cities – in ancient Rome or in the cities of medieval Europe and of the East – the densities of present metropolitan areas are below 100. Tokyo's density is 57, New York's is 42, and London's is 17 persons per hectare.

### Towards a world-wide city

It is natural that, with a population of perhaps about 3 5 thousand million, and with diminishing densities in the urban areas, we may have a total city surface 3 3 times larger than the present one, and perhaps 60 or 100 times larger. When this happens – and we are heading in this direction – most of the cities of the world are going to be interconnected into a world-wide network, into a single worldwide city. This is not a new phenomenon. This evolution started in the seventeenth century when cities broke out of their walls and absorbed the villages next to them, and then absorbed other cities, till gradually the cities merged. The process is already in full swing. The Megalopolis of the East Coast of the United States – where we have practically one continuous urban area from Boston to Washington over a distance of hundreds of miles – shows what we have to expect.

This world-wide city or universal city is not going to be uniform. Unlike the city that we had in the era of static cities, when all cities were practically similar to each other in conception (small, static and simple in structure), the city of the future is going to have parts which will differ from each other, according to their main characteristics and the reason behind their creation. The city is going to have very large and wide areas expanding in all directions, and other areas which will be relatively thin and linear, connecting the massive expanding areas. This form is going to be imposed on the city of the future by three forces. Concentric force is going to bring people close to the existing urban centres, and this process of attraction is going to continue. If the expansion of some of them is checked by topographical and geographical features, as in Rio de Janeiro, then the city will flow into the nearest valleys or plains. Linear force is going to draw out branches of the city along the main lines of communication: roads, canals and railways. The third force will be aesthetic; big parts of the city of the future are going to be drawn towards the coastal regions: lakes, shores and other beautiful areas. What was impossible in the past can now become possible because of the automobile.

## The approach of disaster

Let us now think of all these pressures which are going to be brought to bear on the existing urban settlements: 3 3 times more people in a century and a half, an area 60 to 100 times larger, and a much greater number of cars and machines. The centres of the existing cities are going to be choked to death. The world-wide city which is being born will be asphyxiated in its own cradle. Present-day city centres simply cannot withstand these pressures.

The city is going to destroy many parts of the natural landscape. At present it is spreading without any respect for natural contours or vegetation. The bulldozer technique shows on a small scale what we shall witness in the future on a much larger scale. The natural landscape is going to be lost. The natural skin of the earth is going to lose a large part of its vegetation as the city, in its spread, uses more and more chemicals and insecticides, and opens more and more stone-quarries in order to supply itself with additional materials for growth. All these forces will eliminate many of our areas of natural beauty. To this we must add the contamination of water and air, which is already dangerous and will grow worse at a much higher rate. Many natural values will be lost in the process of constructing the world-wide city.

In this city, man is going to find himself even more confused than at present. The scale of the city is going to be increased beyond his comprehension. He will have to rely almost completely on mechanical means for transportation and communication.

Society does not give any indication that it can be better organized in such a city. We simply do not see the trends yet. Man is already unable to impose metropolitan government in many of the cities of the world. The importance of the surviving local administration is over-emphasized in an organism which has nothing to do with the cities of the past. Many social phenomena, like the behaviour of youth, show that we have not been able to organize ourselves in the present city; and, if the present trends continue, these phenomena forbid us to hope for a better society in the city of the future.

Functions remain irrational. In the process of modernizing our cities we are eliminating the centres; two-thirds of the central four square miles of Los Angeles have been taken over by highways and parking. And we are losing many of the values created in the past; we can no longer see either the Piazza del Campidoglio or many other important squares of the past without being bothered by the omnibuses which stand between these monuments and us. There is no reason to expect that we shall behave better in the future.

Finally, there is the present ugliness of the shell of the city, where we have the contrast of the skyscraper with the slums which have survived from previous eras. Because of the irrational way in which the present city has grown, this ugliness is going to be accentuated still more acutely. Many of our streets are going to look much more like traffic-trains than streets for man. There will be nothing left of the public spaces which man has created for his service and pleasure for thousands of years.

In such a city, man is gradually going to escape more and more into buildings. He will gradually become a troglodyte. Buildings will be more effectively insulated from external noise, fumes and climate. And, finally, nobody will worry about what happens outside the big buildings when man, the

displaced person of the city, is going to be in exile.

Such an evolution will lead the city and civilization towards disaster.

## Looking into the darkness

If we now assume that we do not have any preconceived idea about this urban settlement of the future, we have to start looking into the darkness, as we do not have anything on which to base our assumption. Actually we have only accepted the facts that there will be people for whom there will be settlements, and the settlements are going to be urban. They will not be connected with the production of food through agriculture.

Beyond that, though, we do not have anything on which we can build our structure of the future. We have only one road to follow, i.e., to assume that the settlements to be created are not going to be the ones we have been anticipating, the ones in which we ' are going to have a balance between all forces of economic, social, political, technological and cultural aesthetic value, but only some of them, or only just one category of them. If so, then we are going to be led towards some extreme solutions. If we try to understand the extreme solutions, then we do study the limits towards which even wild imagination can lead; then, by accepting or rejecting those extremes, we can gradually be led to the assumptions on which we can work. We can draw some conclusions which will have a certain value for our projections into the future.

This is what is attempted in this part: A survey of extreme solutions which may be reached if we will not try to create a balance of all forces, which enter into our gate, which are going to be playing a role in the future. In order to achieve it, we try to disentangle ourselves from the present urban settlements, and from any commitments related to them. We look then into the different assumptions by assuming that only one of these forces plays the only role in the future.

- **The pure economic solution:** If we assume that the urban settlements of the future are going to be controlled only by economic forces, then they will gradually turn into a machine, which is going to guarantee to the people the highest level of economic activity; this is going to guarantee the highest income, and this is going to be then the settlement where we will have the idealization of purely economic goals.

An urban settlement of this kind is going to be an extremely rational settlement, where people are going to be related directly to the production which they may achieve. In such a settlement, the heart of every built area is going to be taken by the factories. These may be producing food, or may be factories for synthetic foods, or pools, or fields for cultivation of food, or they may be factories producing industrial goods. The residences are going to be all around them, so that the shortest time will be required for people moving from their residences towards their places of production.

The residences are going to be designed in a way to guarantee the least loss of time for any one moving out of his "bed into his bath, into a breakfast room, towards a factory. This will mean that we may have skyscrapers, the upper parts of which will be taken by living quarters of the babies, infants, the children which are not going to move towards the places of work, therefore they should not come into the lower floors, and create hindrances for the people who will have to move towards the sites of production. Lower floors are going to have the residences of everybody related to the production. Even lower, these people are going to have all the facilities which are indispensable in order to keep them in good shape, in good health for production purposes. Thus the younger generations are going to live all their lives in the upper floors, until they are ripe enough to be trained for production, and then they will be moving into the lower floors, and after being trained, they will move even to lower floors, where they will reside, and every morning they will move from those floors into the first floors where they will find themselves directly in a great factory. If they have to work in the fields, then the elevators will take them into the tractor station from which they will move directly into the nearby fields. If they are assigned into a new field, then they will have to move into a new skyscraper, in order to find themselves in the vicinity of that field. Even elevators, then, may be too time-consuming, and they may be replaced for the producers by the same devices which the firemen are now using in order to demobilise as quickly as possibly and the only difference will be that the people will now be running towards the new equipment where they are going to replace somebody else who will be returning with the same means with which they came, and using the same quarters which they have just left a few minutes ago, in order to save in residential space.

In such settlements, every living person will "be turned into a well-oiled machine which is going to pass through the production line from the top of a skyscraper to the bottom of it until it is unable to produce any more, in which case it will move most probably into the underground cemetery, which will be under the skyscraper, or, if this will be more economic, into a special room where it may be turned into chemicals to be used for plastics which are going to enter the production lines.

- **The extreme social solutions:** This will be the idealisation of the communal system. In such a case, the whole emphasis will be only on functions of the community. The community hall will be the nucleus of every settlement. Around it there will be special classrooms, special halls for community functions, the restaurants, the kitchen, and in the outskirts there will be the rooms which are going to be divided into categories for men, women or for mating people, and separately for children of all ages. In this way, the only life will be the community life, and all settlements will demonstrate in conception and design this central role of the community control room.

In such a case, it is quite probable that gradually it will be understood that there will be no necessity for special quarters for people, as they are not going to have any functions which are going to be performed in the special private quarters. It will be easily then discovered, that what every man needs is only a place to sit on, and a place to lie on. The next step will be a new design which will combine an armchair with a bed. Special push-button techniques are going to be turning the chair into a bed. The only space required for every person then around them will be very small. Just what is necessary to give to every person the possibility to move freely in an armchair, or in a bed. Once he moves out of them, then he should belong to the community organization. Such a solution is going to lead easily to the conclusion that what everybody needs really, is a structure allowing him all the room within it, and this may be turned into a plastic bulb, which is going to protect every person from cold, rain and wind, by providing it with an air conditioned, healthy atmosphere. Thus, it will be possible, as the plastic shell is going to be very light for every person, to transfer his own cell with him. Thus, persons are going to be turned into a kind of fortresses, moving with their own shells, with their own cells, and always trying to spend as much time as possible in the only buildings which will be available, which will be the community halls, and community facilities.

- **The extreme administrative and managerial solution:** This will mean the idealization of the administrative machinery, which is going to have the full control of everybody. In

this case, the central team of every settlement, is the administrative headquarters of it. From it, they can control the movements of everybody. They can direct the workers towards their factories, at the time required. They can direct the school children towards classes in which they are going to be taught exactly what the Management of the city thinks that they should learn every day. They will move people in their leisure hours towards such places where they are going to be taught how to respect and how to serve the central Government.

- **The extreme technological solutions:** The solutions can be of several kinds. We may have the skyscraper solution. The whole earth then is going to be covered by the same type of prefabricated skyscraper.

We may have the whole population living inside the earth, in order to leave the whole surface for cultivation, and production of food. We may have the submarine solutions, if it will be proved that it is more economic to settle the people into great submarines in the bottom of the seas, instead of excavating into the earth.

- **Aesthetic extremes:** In such a solution, the central theme of every part of a settlement will be the cultural hall, a combination of a museum, a park, and a cathedral where people will be spending all their free time moving to the tune of music from one room into the other, where they will look at, they will hear, and smell the best combinations of shapes, colours, tunes, odours and tastes.
- **The combined extremes:** We can now understand what types of settlements we are going to have if we are going to combine the extreme technological solutions for example, with the extreme social ones. Then we will reach types of settlements which are going to combine all forces, which are recognized as important ones, for the achievement of a settlement where everything is going to be controlled by certain very strict rules.
- **The romantic solutions:** It is natural that such considerations lead many people to think of much more natural solutions, of solutions allowing for complete freedom, of solutions allowing people to go back to nature, and live the pastoral life they have been dreaming of. A simple pastoral life though is going to mean a reduction of the numbers of people on this earth. Thus it is against the assumptions of development we are making, and has to be crossed out as an impossible solution. It may turn into a solution to follow a great disaster, where the numbers of people are going to be reduced, on this earth, to a very important degree.

### Conclusions

It is quite clear, that we cannot accept to follow any one of the previous roads. If we leave some forces to get the complete control of the situation in the future, then we are led towards inhuman solutions of the urban settlements. These inhuman solutions are the result of controls, which are exercised on humanity. Without them we cannot have any of the extreme solutions we have described, as people are tending to be served by several kinds of forces, and in order to give the complete control into one category of forces, they must give the control of the whole situation to a special type of persons which are going to lead towards a tyrannical settlement, where the tyrant will be a certain group of people who will be serving only one category of forces.

It is quite natural to conclude that we cannot follow any road leading to such a tyranny of one category of forces.

The solution cannot also be a romantic one, it cannot be a return towards other types of life, such as those of the past. This will mean a reversal of history, for which nobody is prepared, and even if some are prepared, this cannot be taken into consideration, as it will mean the disappearance of the greatest part of humanity.

We have reached therefore the point to look for a solution, which is going to relieve us from all the ventures of moving backwards or coming under the full and tyrannical control of one set of forces.

### The march towards survival

There is a necessity for change. Present trends have to be studied, evaluated and, if necessary, reversed. It is quite clear that in many respects we have to change our road; we must set new goals. We cannot go on looking upon the city of the future as an extension of the city of the past. It is true that in some ways it is an extension of it. For example, the houses of the past and those of the present are not very different; they will probably not be very different in the future, as the dimensions of man have not changed, nor have his needs within a house. He always needs a bed of certain dimensions, a table of certain dimensions, a ceiling of a certain height. There is no necessity to think of a house in novel terms.

In the same way, however, we must think of minor units, the small public space, the neighbourhood, the small community – and these have at present been completely changed by the invasion of the automobile and machine, although this did not necessarily have to occur. We have to be careful to deal with these urban units with much greater respect than in the past. For thousands of years man created such units quite successfully. Why not learn from them and guarantee a historic continuity?

## Dynamic cities: towards proper solutions

We must march towards a world-city. How are we going to do this? We are certainly moving towards this city, but the way we are moving ensures disaster rather than survival and proper development. The question is not one of proceeding, but of how to proceed in the right manner.

To answer it, two goals must be defined. The first is to deflect the present line of march in order to save the existing human settlements which are being strangled. This operation, properly understood, will dictate our course in its first steps. Second, by properly picturing the world-city, we can gradually divert our efforts from the immediate solutions for survival towards long-term goals which will serve man positively. We cannot sacrifice the present in order to create the best solutions for the future. This is why we have to change our course immediately in order to meet the present situation. On the other hand, we cannot sacrifice the future in order to avoid inconveniencing our contemporaries. Thus we have to set long-term goals. It is the combination of short-term with long-term goals that will determine our line of march towards the future.

Our first goal is to achieve the best possible in the present. Our real problem today is that we are dealing with dynamically growing cities without really understanding that they are dynamic and no longer static. If we are to deal with such cities, we have to set the ideal goal for man. Up to now, man has conceived several types of ideals, but they have all been static. We now have to create the ideal dynamic city, or the ideal Dynapolis.

We have several cases to work with. The most typical is that of a round city which grows in concentric circles. This city has only a simple heart. If we let this city grow, as we are doing at present, it will finally strangle its centre. How can we avoid this? We are dealing with a city which is besieged by its

own body. In seeking to escape from this besieged city, we cannot break out in all directions, as we are doing at present, for in every besieged city we have to break out in one direction only, the direction of least resistance. We have to let the centre grow in this direction. It will grow into a larger area than the present one. This area is going to attract the new parts of the city all around it; but then we have to foresee the next stage, which is another expansion from the centre in the same direction, which again attracts the city all around it. By continuing this process we shall create a dynamic city which is parabolic, with a parabolically expanding centre. If the city grows continuously, then it will continue as a parabola. This can be called the simplest form of the ideal Dynapolis. If this city later becomes static, then the parabola will close naturally at its end (fig. 7).

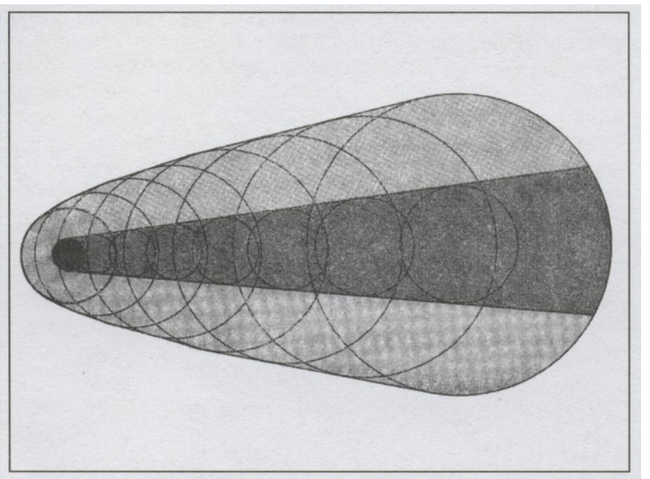


**Fig. 7:** The simplest form of the ideal Dynapolis – The expansion in one direction allows the centre to expand without difficulty.

### New Dynapolises – The axis of growth

We also have the opportunity for creating new cities. But this very seldom occurs. We have fewer opportunities for creating a dynamic city, because this kind of city has not been understood. Lately, though, we have had two cases of new cities that have been obeying the principles of dynamic growth. These are the cities of Islamabad, the new capital of Pakistan, and Tema, the new port town of Ghana, adjoining its capital. These are examples of ideal Dynapolises of the simplest form, implemented in cases in which there were no commitments at all (Islamabad), or in which there were few commitments, so that the areas took the proper shape right from the beginning.

Islamabad has been conceived as a dynamic city in a landscape at the foot of the Margalla hills. The heart of this new capital of Pakistan is now under construction. The city is going to be small at first. What else could it be? Any new organism has to start from a small nucleus. This nucleus is going to contain those functions that are indispensable for a new capital: an administrative centre for the whole country, a cultural centre, a bank, an institutional and business centre, with corresponding residential quarters and facilities. This city, which in its first phase will have 50,000 inhabitants, is going to grow continuously until it will contain 2 million people in the foreseeable future. It has been planned, therefore, for 2 million people. But it has been conceived as a city which can grow from 50,000 to 2 million people while remaining compact and self-sufficient in every phase, and it will also be able to grow from 2 million to 5 million and even more without changing its structure or sacrificing the first phases to the future phases or vice versa.

The city of Tema was conceived as a Dynapolis after the first communities were planned and built, though without any commitment towards its centre. Thus, it would be conceived as a city of 100,000 people in its first phase, and this initial figure would grow into hundreds of thousands. The fact that it is close to the sea and to the capital city of Accra, with which it will one day coalesce into a single urban area, has led to the decision to establish an axis of growth. With its back to the seafront, the city is going to grow inlandwards exactly as the capital city has already done, and this in a natural way, as many cities have grown under similar conditions, regardless of whether we have noticed that or not. A study of the whole area has proved that, between Accra and Tema, a third centre could and should exist, which, also having its back to the sea, would likewise grow inlandwards. Thus we should have three Dynapolises, all growing parallel to each other from the sea inlandwards, and this would allow the population of the metropolitan area to grow from some hundreds of thousands of people to millions.

## Re-shaping existing cities

There are cases in which the theory of the ideal Dynapolis can be implemented not only in new cities, but also in existing ones. Such proposals have been worked out for several major cities such as Washington, Copenhagen and Beirut, and they have been implemented in some – for instance, in Khartoum. In the metropolitan area of the new capital of the Sudan there are three cities, Khartoum, Khartoum North and Omdurman, on the three sides of the two Niles. The major problem of these cities lies in the fact that commuting from one to the other requires the construction of bridges or, perhaps in the future, tunnels which must be quite long and very expensive. The major problem, therefore, was how to create a city which would not be spending its budget on the crossing of rivers. An analysis has proved that the major part of the future expansion must be confined to one of the cities, with the others becoming static as soon as possible, in order to decrease the number of crossings over the river, which otherwise will increase enormously. Such an analysis has led to the formation of a plan for the metropolitan area of Khartoum which provides for the dynamic growth of the city of Khartoum and the gradual stabilization of conditions in Omdurman and Khartoum North.

Such a plan, which has been approved, is now being implemented. It allows for the growth of Khartoum in a dynamic way which will guarantee the proper functioning of the whole metropolitan area at a minimum cost for its inhabitants.

Similar solutions have been suggested for several types of cities such as Washington, which has to grow in one direction, probably along the Potomac River, in order to avoid the great pressures which are coming in from all directions; or Beirut, which has to develop a centre, far from the present one, with its back to the sea and facing inland; or Copenhagen, which, in order to save the cultural values invested in its centre, must develop a pattern of landward growth, for it has been estimated that the present population, which is about 1.5 million, is going to grow to 5-5.5 million a century from now.

There are cases, though, where it is impossible to impose a theoretically ideal Dynapolis on the existing city for a number of reasons. Such a case is the city of Baghdad, where the dominant feature is the river Tigris, along which Baghdad was developed in the past in a practically linear way, and along which it will have to be developed in the future for many topo-

graphical and climatic reasons. In this case the natural form of the city is dynamic along the river. Thus, Baghdad cannot turn into a uni-directional Dynapolis. Because of this, it will always be subject to pressure on its centre, which is preferably going to be in a central location receiving pressure from at least two directions. In order to avoid these pressures, the master-plan of Baghdad has been conceived with a view towards growth, not only along the Tigris, but also in a vertical direction, for otherwise the roads near the river would be choked to death. Such growth in a vertical direction is not going to succeed unless the new parts of the city have advantages over the parts near the river. This is why it has been suggested that the pattern of the river should be repeated by digging major canals parallel to it – a development which would draw the city out in parallel lines. Such a solution will not have the advantages of the ideal Dynapolis, but here the practical limitations set by the landscape show that we should not speak of theoretical solutions, but should try in every case to solve the problem in what is the best possible way in the local circumstances.

What is ideal for one city with one centre which is surrounded by a uniform plain, such as Tema, is not ideal for the city of Baghdad, where the dominant feature is a great river.

A different situation is represented by the city of Athens, which does not lend itself to the implementation of the ideal Dynapolis. Here the basic feature is the fact that the city is surrounded by four mountains and is confined to a valley which imposes its own rules. The major part of the valley has already been filled by densely built-up communities. Thus, there is only one direction for expansion, namely to the north-east of the city. This is the only natural direction for expansion, but it is no longer a practical direction because of the densely built-up central areas connecting the present centre with the new one that would have to be created to the north-east, at the cross-roads of the national highways. In such a case the dynamic solution for Athens turns out to be the creation of a new centre in the non-developed area. This will act to relieve the existing centre of Athens from all the pressures on it, and will allow it to survive as a normal centre for a normal metropolitan area that now serves 2 million people. The additional millions that are to be expected by the end of this century, and the millions that are going to be added later, will need the new centre which has already been proposed and is now under discussion.

## Network of cities

However, there are cases in which the situation is not so simple. These occur where we do not have one single city, or a metropolitan area with one definitely predominant centre, but rather networks or centres serving urban areas which have already coalesced with each other. In such cases the solution no longer consists in letting the present centres expand, for they are usually choked and cannot expand in any direction without affecting their own areas as well as the adjoining urban areas. In most of these cases the real solution lies in deciding that, as these areas have coalesced and have no more space in which to expand, they should be turned into static areas as soon as possible. The additional population which will be attracted by the major city will then have to be absorbed by new centres; and, as the whole area is going to grow into one of a higher order, a much greater centre has to be created outside the built-up areas in order to relieve pressure and to serve, not only the existing cities, but also the new cities that are going to be created in the surrounding areas.

It becomes quite clear that, in the near future, we shall have three phases in the development of dynamic cities: the new cities which, as Islamabad and Tema prove, can be a great success and which must be multiplied if we want to save our cities; dynamic cities following the principle of an ideal Dynapolis where this is possible (and here we shall have to conceive patterns allowing our present cities to expand dynamically); finally, as this is not going to be possible in all cases, we shall have to decide that several cities will have to stop at a certain stage, while other cities in their vicinity will have to cope with the new population, to become centres of a major order and to provide services for the widening urban areas.

We will certainly also have cities which will remain static because of their locality or their functions. These will be mostly small cities, in outlying areas which have been bypassed by present trends, or cities which are in such small areas or valleys that, for them, there is no possibility of major growth. Such cities are going to survive as remnants of the past; but, as the whole of the world's additional population is going to flow into major cities, the material importance of the old-fashioned cities will decrease, while their cultural importance will have great value for us, since these cities are going to be much better to live in than the cities that will be suffering from population pressure.

## The survival of values

During this period of dynamic growth for so many cities, we shall have to consider very seriously the following facts. There are economic, historic, cultural and aesthetic values already invested in our present cities. These values are at present in danger of becoming completely lost under the pressures which are accumulating in the existing urban areas. In a few decades, man, by recognizing the necessity to act in a different way in shaping the surface of this earth, is going to change his policy. By then, though, there is a great danger that all values hitherto created by thousands of years of civilization in urban form are going to be lost. Man will have lost all the examples of the urban way of life which have been created after hard effort and by trial and error through hundreds of generations. And their loss will mean a great disaster, even if man averts the death of his civilization.

At this stage we have to draw one conclusion: there is an imperative necessity to save all existing cities which contain certain values for as long as possible, until the time for the proper formation of the new world-city comes, as these cities with values are going to be very important for historical continuity and for the survival of the values of the past in the city of the future.

These dynamically growing cities will have to take two factors into account:

- How to save the values of the past.
- How to create the best values for the future.

In pursuing this policy, we shall have to make sure that we have the best solution for all five elements that will enter into the formation of the city of the future. We have to protect the natural landscape. It is high time to decide in advance which parts of the natural landscape must be saved, and to keep them open and to protect them forever by acquiring the ownership of them for the community. Man and society have to be served in the best way. This can be achieved by respecting every form created by them in the past and by the development of the new city in such a way as to serve man and not the machine. City functions have to be served in the most reasonable way. If they are functions that are directly related to human dimensions, they should follow the experience of former generations. Man has not changed the dimensions of basic things. If, on the contrary, functions are the result of ad-

ditional needs, such as commuting over distances unknown before in urban areas, then we should find the most rational solution corresponding to the new requirements and new possibilities.

Thus the form of the city to come is going to be the product of different forces: those derived from man and from human dimensions, as in the past, and those which correspond to the new dimensions imposed by the machine, which must be dynamic and be unrelated to the past, as there were no such problems and solutions in the past. This must be done with only one thing in mind: how to serve man best, and not how to expand and enlarge existing urban forms which are incommensurate in both scale and content with the forms that are now going to have to be created on a completely different scale. The coming dynamic city will be, of necessity, a combination of the city of the past and the city of the future. It will be traditional in its minor units and futuristic in its major units.

## Ecumenopolis: a static world-wide city

The dimensions of the world-wide city are going to be, towards the end of the twenty-first century, the largest that will be compatible with man's survival. Certainly this is a flexible notion, based on modern technological progress. We assume that technology will continue to develop as at present; this is the only assumption on which we can imagine this earth being able to house some tens of thousands of millions of human beings. The moment will come, though, when even a technology that will allow of a much greater production of food than at present is not going to allow of any further expansion of population. There will be a limit to this because, even if we solve the problems of providing enough food, water and energy (we may take for granted a constant increase in food-production by an ever-developing technology, and also a full use of ocean water and energy sources), the population is going to reach a magnitude beyond which it should not expand. An increase beyond that magnitude would not leave enough space for the formation of a proper habitat for man, for the preservation of nature, and for the survival of open spaces in proper balance with the built-up areas of the world. At this point the population of the earth will reach its limit.

This limit, as I have already suggested, will probably be on the order of not less than 20 thousand million people and not more than 50; and for practical purposes, we can assume it to be something like 35 thousand million. As far as man can understand and imagine the future, this is the population of the world-wide city that we can expect by the end of the twenty-first century. As the city will then have attained its maximum population, and therefore its maximum physical dimensions, it will be static.

Humanity, after having lived for thousands of years in static settlements, villages and cities, and after having passed through a few centuries, four at the maximum, in dynamically growing settlements, will finally settle down in a world-wide, static, ecumenical city.

This city is already under construction. It will absorb almost all the important cities of the present, and will gradually grow out of them through their dynamic growth, as well as through the dynamic growth of the new settlements that are going to be created. It will be composed of almost all the major cities of the past and present. This city is going to expand widely over the plains and the great valleys, especially near the oceans, seas, great lakes and rivers, since the most restrictive factor in its formation will be the presence of water. Even when de-salinized water can be used economically for urban purposes, it will be available only near the level of the oceans and lakes, so these will attract the city of the future, as the small rivers attracted primitive settlements.

The ecumenical city is going to pass through two phases. In the first phase, which has already started, it will gradually build up through the expansion of dynamically growing settlements. It will consist of dynamic parts and thus will change automatically from more primitive towards more developed forms. When it finally reaches the maximum calculable population and estimatable area, it will not expand any more, and in this phase it will undergo only those minor alterations that will be indispensable for the re-adjustment of the population, the economy, and the functions necessary for the world-wide city.

## The shape of the Ecumenopolis

The city of the future is going to form a world-wide network. The centres of a higher order are going to be located mainly where the greatest concentrations of population are, i.e. in the greatest plains which have the best climate and the best water-resources. The connections between them will follow the natural lines of communication as well as some underground and submarine tunnels and the corresponding air-corridors (fig. 8).

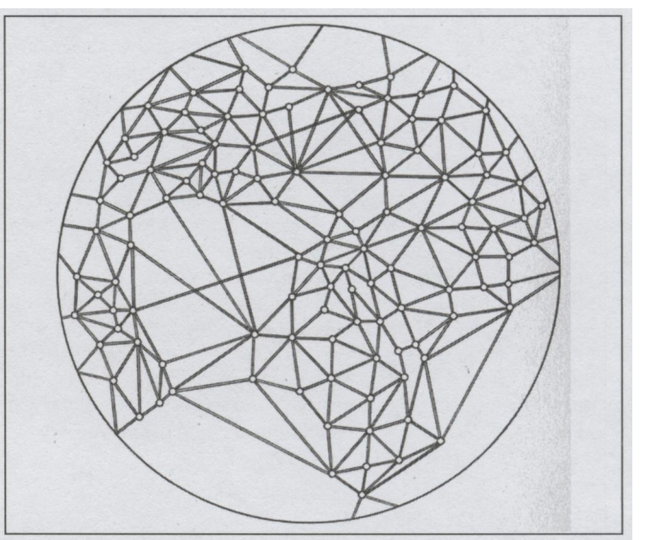


**Fig. 8:** The city of the future will form a worldwide network consisting of centres of several orders interconnected by settled parts of various importance.

In this network of major and minor centres, the Ecumenopolis will have a hierarchical structure of centres. The structure will range from the very small centre corresponding to present neighbourhoods, through centres of middle importance with a population corresponding to the large metropolitan areas of the present, i.e., from 5 to 10 million, to centres of the highest order with populations running to hundreds of millions. These centres are going to form networks of different orders within the major network.

Several of these centres are going to comprise all types of functions, since they will provide administration, management, transportation, culture, production and pastime for a wide area. Several others, though, are going to be specialized centres catering for special local factors or traditions. Such cities – for example, Cambridge, Massachusetts – will attract all types of educational facilities and become impor-

tant specialized centres of education of a very high order in the network of the world-wide city, while others will be important cultural, political or pleasure centres.

In this way the Ecumenopolis is going to be much more democratic in its nature than other cities of the past. The fact that it will be world-wide means that it will have no beginning and no end. It will, therefore, not have any central point that will be of much greater importance than the rest. By necessity it will lead to a much more democratic society, in which centres all round the world will be able to distinguish themselves by the type of services that they will provide, by the type of people that they will attract, and by their excellence in certain particular fields.

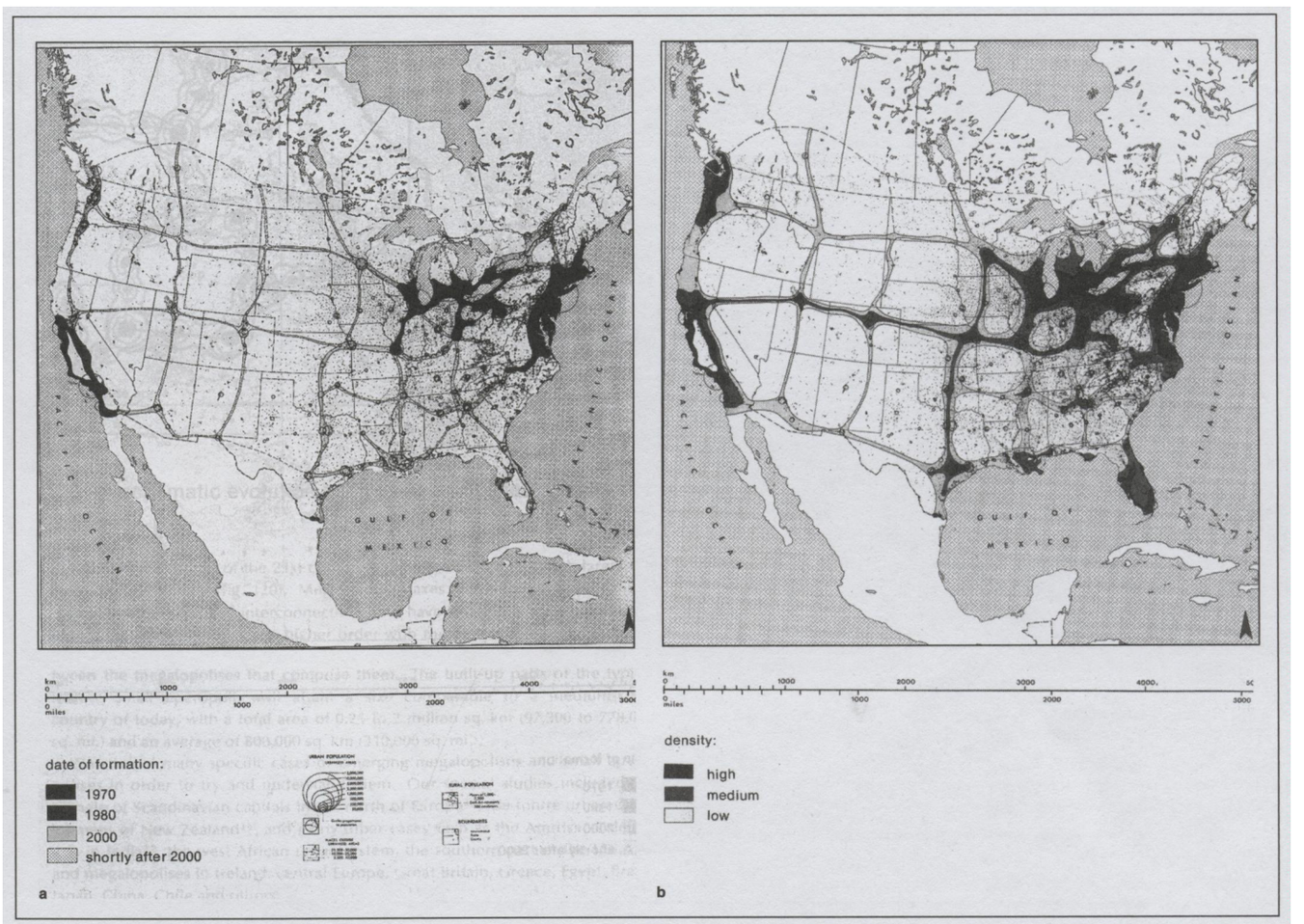
The notion of centrality is going to be different in the world-wide city. There will be no single central place, but a number distributed all round the world, which will be more important than the others of a lower order in their environs, but of equal importance with others not in their immediate vicinity. However, even centres in the immediate vicinity of the major centres will be able to distinguish themselves through achievements in specialized fields. There will no longer be any reason why a central area in the universal city of Africa should not be the seat of political power for at least a major African region, and why great centres of education and culture, deriving their forces from the roots of African traditions and civilizations, should not be developed near the lakes on the high plateau of eastern Africa.

## Nature and the Ecumenopolis

The preservation of the natural landscape and natural elements like air and water is going to become increasingly important in the Ecumenopolis, since in many areas and in many respects we may be reaching the limits of the possible use of natural resources. What part of the natural landscape is to remain free and unencumbered with any type of construction will have to be determined by a calculation of the extent of the areas that must remain free of any man-made works in order to provide proper space for production, preservation of wild life, leisure, and the proper balance of oxygen, hydrogen and nitrogen in the atmosphere. To infringe upon any part of the natural landscape or natural resources which have not been earmarked for development in advance is something that will not be allowed (fig. 9).

The areas to be preserved will fall into several different categories. Certainly the most beautiful areas will be preserved, so that we can expect the vicinity of minor lakes, hills, mountain-sides and waterfalls to be scheduled in this category. Areas which are potentially very productive will also have to be preserved, as well as those which cannot be built on in an economic way, either because they are at high altitudes to which water cannot be lifted at an economic cost, or because they cannot be built upon at a reasonable cost.

The total natural resources which are to be preserved will be broken up into areas of different orders of magnitude,




**Figs. 9:** Megalopolitan system in the U.S.A., 2000 (a) and Ecumenopolis in U.S.A. after 2100 (b).

varying from very big areas in deserts or in great forests to very small gardens or parks within the built-up areas.

These natural areas will either cover surfaces of different dimensions and shapes which will have a certain importance as natural areas, or they will form long strips connecting the areas of that kind, so as to allow man to move from a minor area towards a major one. As distinguished from the city of the past, which was a built-up area surrounded by natural landscapes, the natural landscapes of the future are going to be surrounded by built-up areas. But they will have to form a system of interconnected natural areas.

The natural landscapes that are to be left on the earth are not only going to be of different sizes; they are also going to be of different characters, ranging from those which will be left completely untouched by man, in order to preserve wild life to the greatest extent possible, to those which will be gradually remodelled by man, down to the decorative gardens which will try to catch the meaning of the form of the whole earth and to present it on a very small scale in a symbolic way.

The small parks and gardens will, therefore, be of different kinds according to the area in which they are laid out. In India or Pakistan, for example, they should represent all the different landscapes from which the people come: the landscapes of the Indus Valley, Bengal and Sind. In these miniature natural landscapes man will find the reflection of the major landscapes from which he derives his ancestry.

These natural landscapes should offer man all the challenges which he will have lost through the construction of the world-wide city – the challenges of the open oceans and wild mountains which man should always try to conquer. As Bertrand Russell rightly tells us, 'Man should always be given the chance to cross the oceans on rafts like the Kon-Tiki.' These challenges will also exist on a very small scale in the gardens and nurseries where children will be given a replica of nature within the dimensions of childhood in order that they may start to conquer nature on this scale with their bodies and minds. Thus, every family garden and community garden will symbolize nature, its variety, its problems and its relation to man.

## Man in the Ecumenopolis

This is the most difficult problem that will have to be faced by the people who will be responsible for the construction of the city of the future. It is much easier to speak of a system of transportation, of cars and machines, than of man, the great unknown. What kind of man will inhabit the city of the future? The kind that is closer to the classical ideal, or the kind equipped with all sorts of mechanical extensions that reduce man to a manipulator of machines? I myself hope that the kind of man that is going to inhabit the ecumenical city will be much closer to the Hellenic ideal (fig. 10-14). The reason is that this is an ideal which has appealed to the majority of people

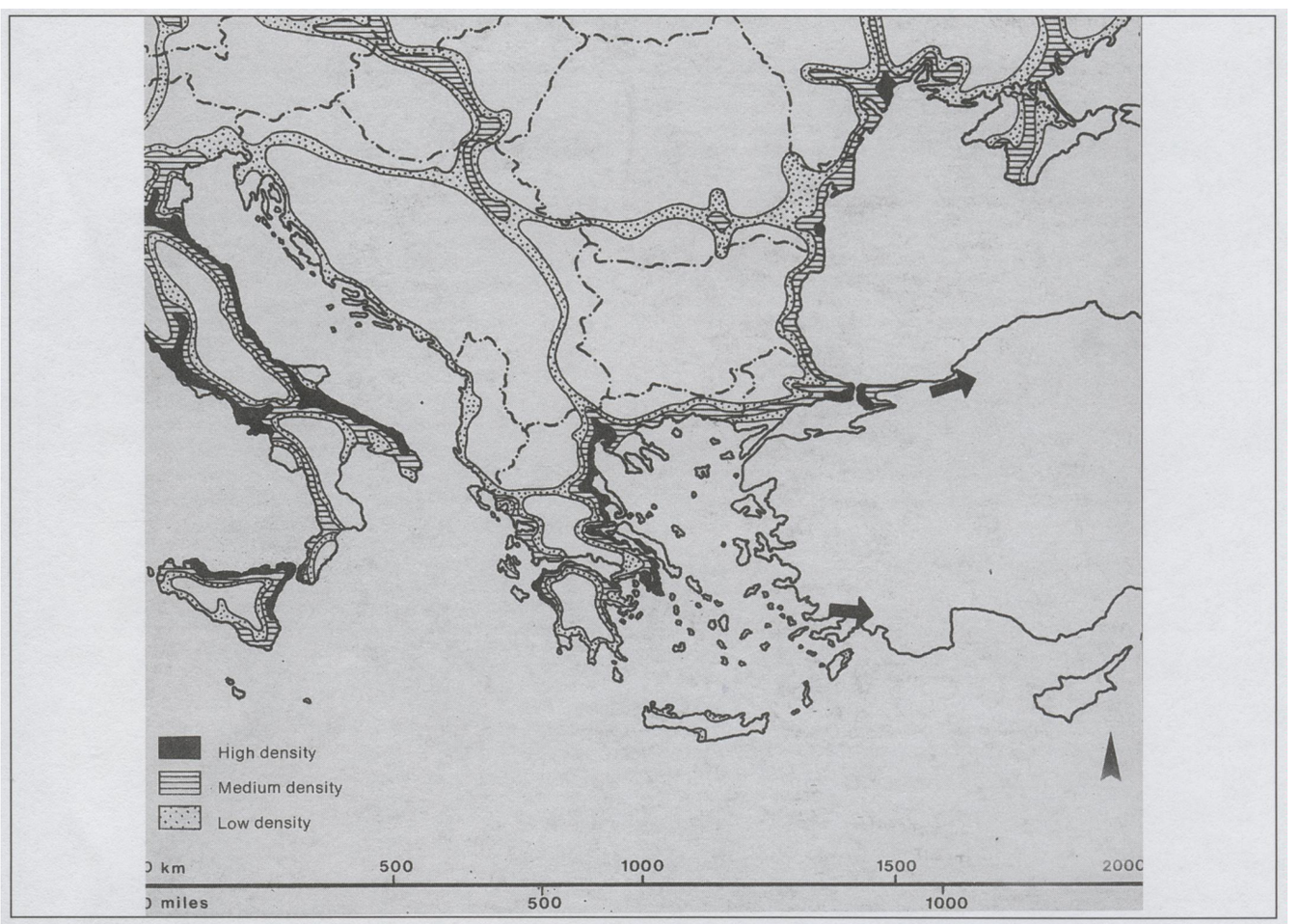



**Fig. 10:** Ecumenopolis in Greece, part of a first concept of Balkanopolis.

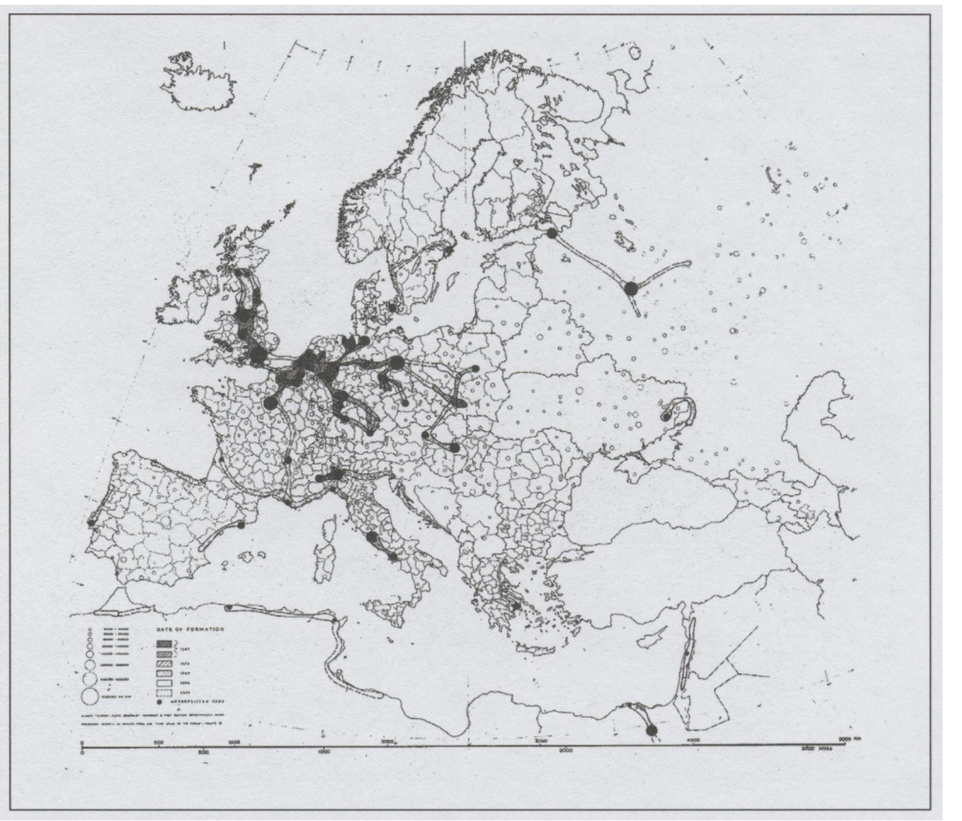



**Fig. 11:** Europe – Megalopolises.


**Fig. 12:** Europe – Ecumenopolis in 2060 (preliminary study).

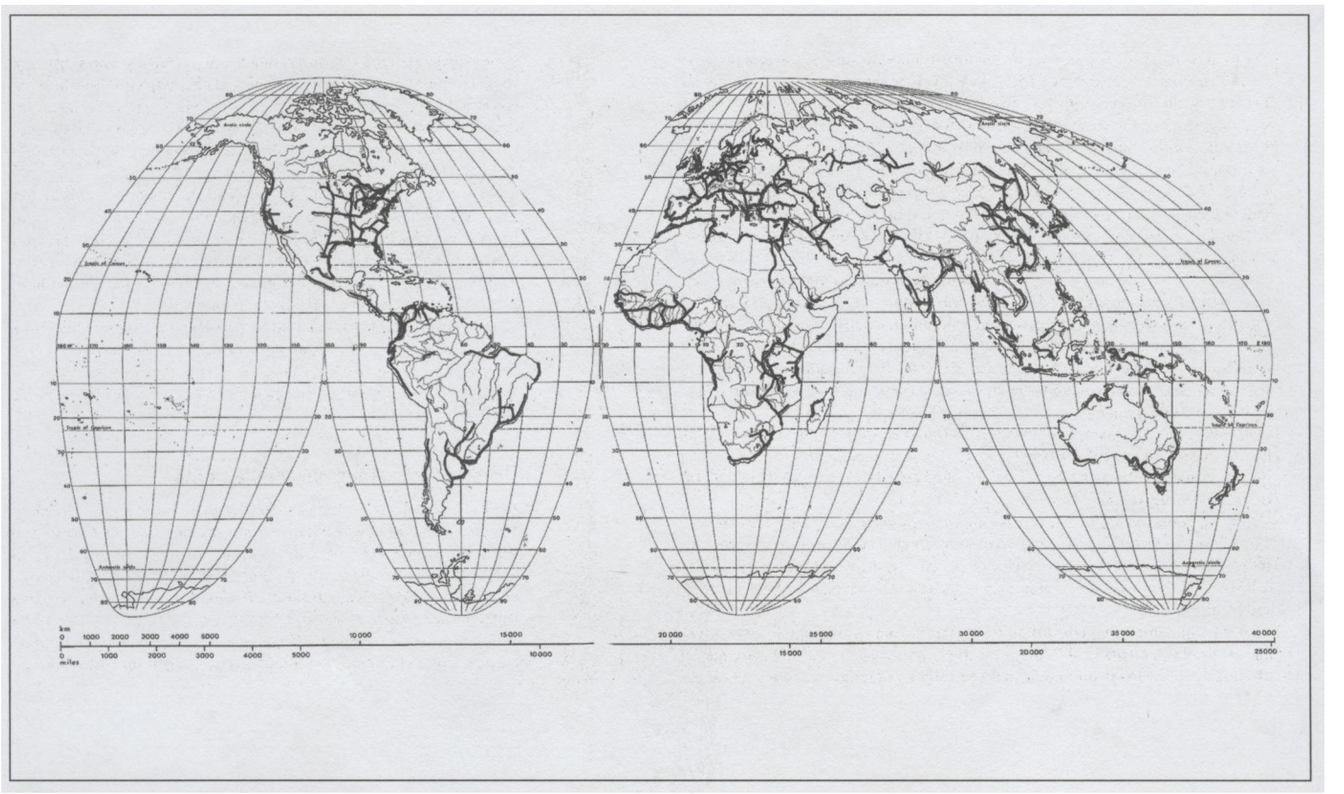


**Fig. 13:** Global evolution of eperopolises in the second half of the 21st century.

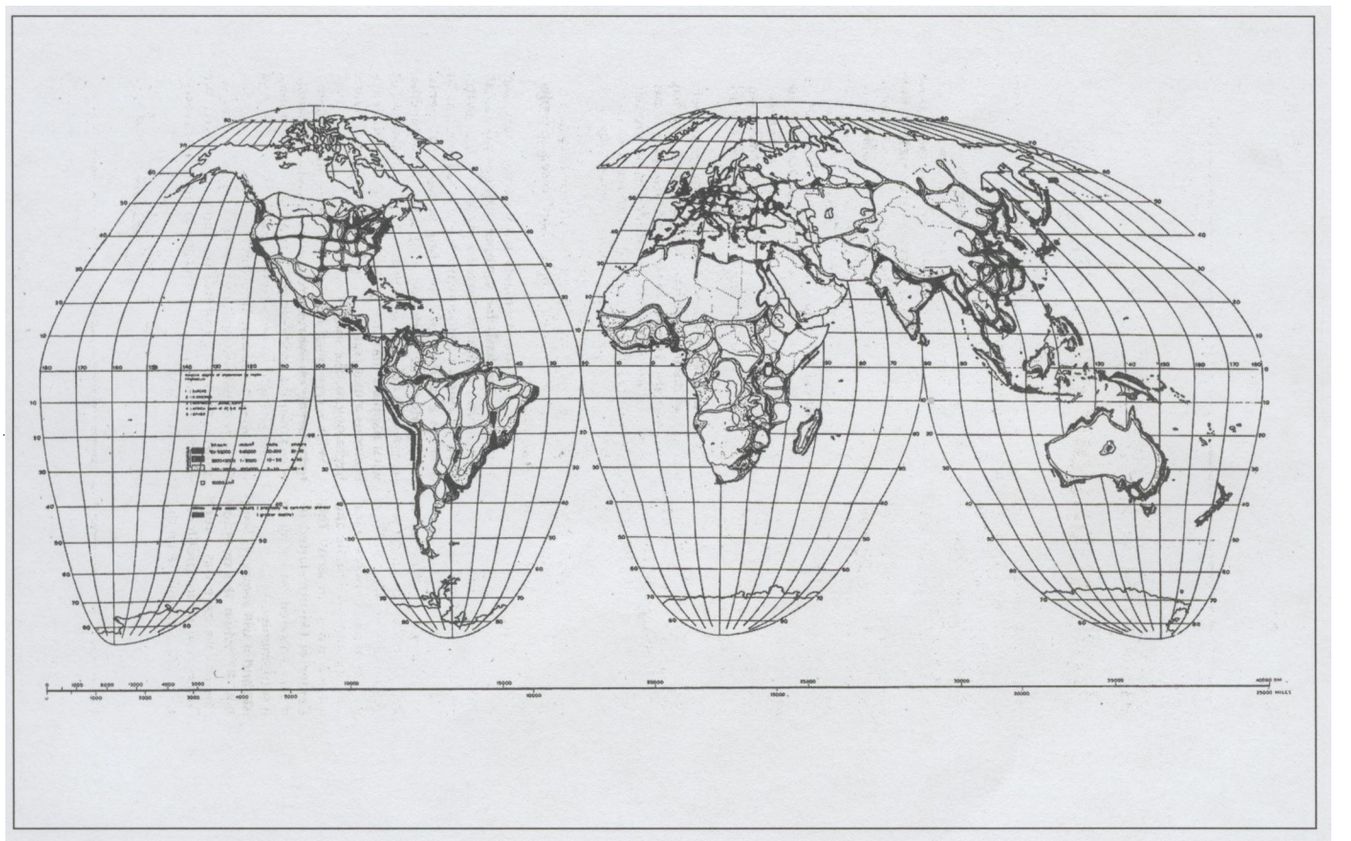


**Fig. 14:** Ecumenopolis in 2060.

throughout the history of man. This is natural, if we remember that the Greeks idealized, not the Greek type of man, but a universal type derived from several parts of the world. They were able to understand this universal type better, because they were living at a cross-roads of civilization and in a type of landscape and area halfway between the cold and hot climates. It is natural for us to assume this kind of man to be the typical kind for the future, since this kind comes from an environment which was preferred by man in the past – the Mediterranean and Middle Eastern environment – and which is also going to be preferred in the future, as is indicated by the present trends towards the Mediterranean, Florida, and the West Coast of the United States.

However, we certainly cannot expect that there will be only one type of man in the Ecumenopolis. On the contrary, we should allow for all types of people. If I speak of one representative type, it is because I believe that we might be tending towards a single civilization which might have several of the characteristics of the ancient Greek culture. For similar reasons, the ancient Greek culture can be taken as being representative of several ancient civilizations.

The Ecumenopolis should, however, leave opportunities open for all types of people of the present and the future. We should not predetermine man's development, we should only set the frame for it. With this in mind, we should provide for the survival of all types of natural landscape and cultural values of the past, and we should create no more than a frame for the future life of man, leaving it to him generation after generation to shape his proper habitat for himself.

If the Ecumenopolis ought not to predetermine the development of man, it also should not predetermine the development of society. The city should provide the physical shell for any type of society that may develop in the future.

As we do not know what political systems will finally survive or develop, any consideration of the city of the future should be based, not on political theories, but on dimensional considerations derived from such features and such forms as will probably remain unaltered in the city of the future. Among these then are the human dimensions, for example. As we do not expect man to double his physical size, we should always reckon with the existence of the human scale in the city. If we speak of the larger scale of the city – a scale that is no longer influenced by the physical dimensions of man and his human scale – we think of magnitudes derived from organizational considerations. Man is tending to form neighbourhoods and communities of certain dimensions which can be served best by one system of shopping-centres, irrespective of the political or social system.

In order to allow man and society to develop freely, the ecumenical city should respect the rules which are imposed by the structure of the landscape (plains and mountains, oceans and rivers), as well as those based upon the dimensions of man and the forms of organization in his social life.

## Functions in the Ecumenopolis

Traffic is going to be the greatest problem of all in the Ecumenopolis. The number of the people and the amount of the goods that will have to circulate are virtually unimaginable in relation to present figures. Freedom of development will mean a much greater mobility of people; but, at the same time, these will need permanent settlements for their residence and for their places of culture and work (fig. 15). The city of the future will have new systems of transportation. The time that we spend in the most unreasonable way today is the time spent in moving about within our urban areas. We are going to need a completely different system of traffic for men and goods. This is going to be an underground system of very high-speed traffic for all types of vehicles both for mass transportation and for individual transportation.

In the city of the future both types will co-exist, and, as greater numbers of people will require individual means of transportation, the whole system is going to be based on tunnels connecting the main points of the ecumenical city. For

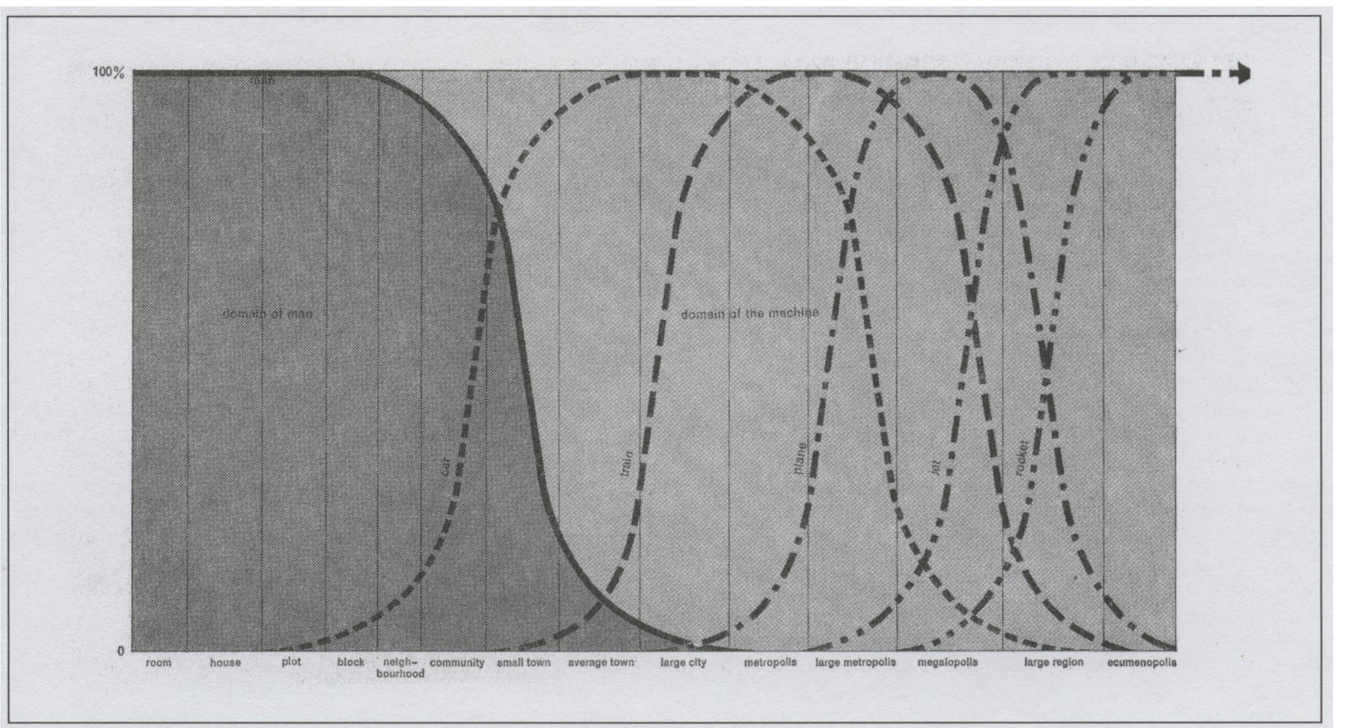



**Fig. 15:** The efficiency and importance of different means of transportation in relation to the Ekistic Logarithmic Scale.

the largest dimensions of all, transportation is going to be based on a system of rockets; for the very large dimensions short of that, a system of jets or their successors will be utilized. For distances of hundreds of miles, which will be of interest to the great bulk of people for their daily movement, man is going to rely on a system of radar-controlled cars in radar-controlled underground tubes, where millions of cars will move with the greatest safety at speeds of hundreds of miles an hour, allowing people, with a mere turn of the proper dial, to travel distances of miles in a few minutes and find themselves within a few hundred metres of their final destination, which they will then be able to reach by driving or walking.

If the traffic-problem is solved, then residence can be in the best locations of this world-city, as there will be no reason for people not to select the best beach or mountain or hillside for their residence, many miles away from their employment and other functions, with no fear of losing an important part of their time in sitting idle and getting nervous in long queues on the highways and at the crossroads of the city.

Places of employment are going to be of two categories. The most important will be where the white-collar workers, working with computers and automatic machines, are going to be employed. These places could be everywhere, from the small communities to the major ones, as they will be clean and will not create any noise or obstruction for the neighbourhood. This is where the bulk of the people is likely to be employed. There will also be other places of employment which will be connected with the raw materials close to the bauxite mines, where we should expect the future aluminium plants to be. These will be so automated that they will employ only a few people who will be able to commute easily by airplane from their residences. Employment connected with natural resources will be much more scattered than it is now, and much more dense in the major concentrations of urban areas.

Opportunities for leisure will always exist near residences, but also in other appropriate locations (sports, for instance, near the oceans and lakes or mountains) since the transportation problem will be reduced in importance.

Many of the functions of the city are going to be underground, exactly as our body-functions are underneath the skin. Not only are the water-supply and sewage and power-distribution and communications systems going to be underground, but the whole system of transportation of man and goods is going to be buried deep in the earth as well, in order to leave the surface for man and his buildings.

Thus, buildings which are beginning to lose importance, architecture which is beginning to be forgotten, and art which is hidden between machines or inside buildings, are all going to come out into the open.

The natural landscape that is to be preserved and remodelled in the best possible way is going to provide the proper diagram for all types of buildings. As buildings are not only utilitarian but also create the cultural environment for man, and as man should be free to develop his culture, we have every reason to believe that buildings should not be as permanent as the underground networks of water and transportation will be. They should be lighter, so that they can be changed in accordance with changes in culture and in aesthetic habits in the city of the future, whereas the city's foundations should tend to become a permanent fixture, particularly the tunnels that will form networks for all types of movements. The superstructure of the city of the future should be light and interchangeable, in order that it may be developed gradually into the most ideal habitat for man.

Is life to be tolerably human or even tolerable in this world-wide city? Is life even going to be possible in this monster city, controlled by machines which will encompass the earth? The answer is definitely 'No' if we allow this world-wide city to expand without any respect for man, as it has been expanding up to now. It should be 'Yes', though, if we recognize the fact that this city should be built for man, and if we take into consideration the necessity of creating the proper environment for him.

This new environment is going to expand over large distances, and it will have to be traversed by mechanical means. We shall have to hop in rockets or fly and drive at speeds of hundreds and thousands of miles an hour. This, of necessity, is going to have to be done in capsules. We are already being taught to live in capsules by travelling in modern jet-planes. Man will have to adjust himself to the notion of living in two types of space – in the static space on this earth which he controls, and in the fluid space which he will be able to control only within some kind of capsule.

## The basic human community

Up to what size in the Ecumenopolis can the solid space under human control be carried? The answer can only be that it will have to correspond to human dimensions. We are used to the notion that our clothes must correspond to our body. We have to learn that our rooms do not appreciably change dimension when there are changes of culture, civilization and phase. This is also true of houses. On the other hand, we saw that this will not be possible for the ecumenical city, since this will expand beyond the human scale. Where should we stop, then, in expanding our static space for man, between the Ecumenopolis, which cannot have static space because man needs fluid space here, and the house, where space, we hope, will necessarily continue to be human?

If the present trends persist, man will continue to flee into the house and will become a troglodyte. This is not right; we should expand human space as much as possible. We have to find this human space and to form it into the basic cell of the ecumenical city. The dimensions of this basic cell will be those of the human community.

Is it right, however, to build the ecumenical city out of cells consisting of human communities? Yes, if we understand that we are only creating a shell, and that this shell is going to be re-built by every successive generation that uses it. What is necessary is to accept the principle that the ecumenical city will consist of cells of human communities, and that it will find their proper dimensions. Then every generation and every type of inhabitant will give the proper shape to the community in which he is going to live. As the construction, as we have already said, is going to be light and less permanent than it is now, this is a community that can be reshaped by succeeding generations.

This must be derived from human dimensions. We are now in a position to see where we stand. A study of the ancient city has shown the point at which man has set the limits of human dimensions in the past. Corresponding studies of present-day cities, in which people are still moving freely and forming natural communities, have confirmed these findings.

There are two types of communities which have been formed since ancient times. There are those which correspond to the minimum distances that man cares to walk, within which he can find the minimum of services, and there are those which correspond to the average maximum distances that man is willing to walk, within the radius of which he can find a large number of services.

The dimensions of the minor community are up to a length of 800 metres and a width of 400-500 metres. In such communities the people would never live at a distance of more than 400 metres from the centre. Such communities are rep-

resented by the minor cities of ancient times, like Priene, and by minor present-day communities, with facilities, shops, etc., that are to be found in many contemporary cities. The major group of the human community corresponds to major cities of ancient times, like Athens, where the maximum distance in which people live from the centre is one kilometre. It also corresponds to the maximum distances covered by man in contemporary cities in search of almost all indispensable facilities.

In the light of these two considerations, we are now beginning to build communities which will form the cells of the city of the future. The basic principle in them is that man should be able to walk in order to satisfy all his needs in the community. The central part of them is the 'soft' part; there, man is in control and the space is formed with no influence of the machine. Outside, on the contrary, machines are free to run at very high speeds, using all their power, facilitating transportation and communication over longer distances.

Communities like those built in Baghdad in 1955, or like those now under construction in Eastwick, show how this principle can be implemented for lower or higher income areas, for a society with few or with many cars.

Communities like those of the University of the Punjab (fig. 16), which is now under construction, or like a major community corresponding to a small ancient city, show how the same ideas can be implemented in major institutions.

Communities like downtown Louisville, which has been approved and is going to be constructed, show how we can create human surroundings even in over-congested areas.

Finally, communities like those of Islamabad show how a whole system of major and minor communities can be created, and how, by expanding these, the system can cover wide urban areas while still allowing for the best type of metropolitan structure (proper systems of transportation, communications, facilities, etc.) with the best type of environment on a human scale.

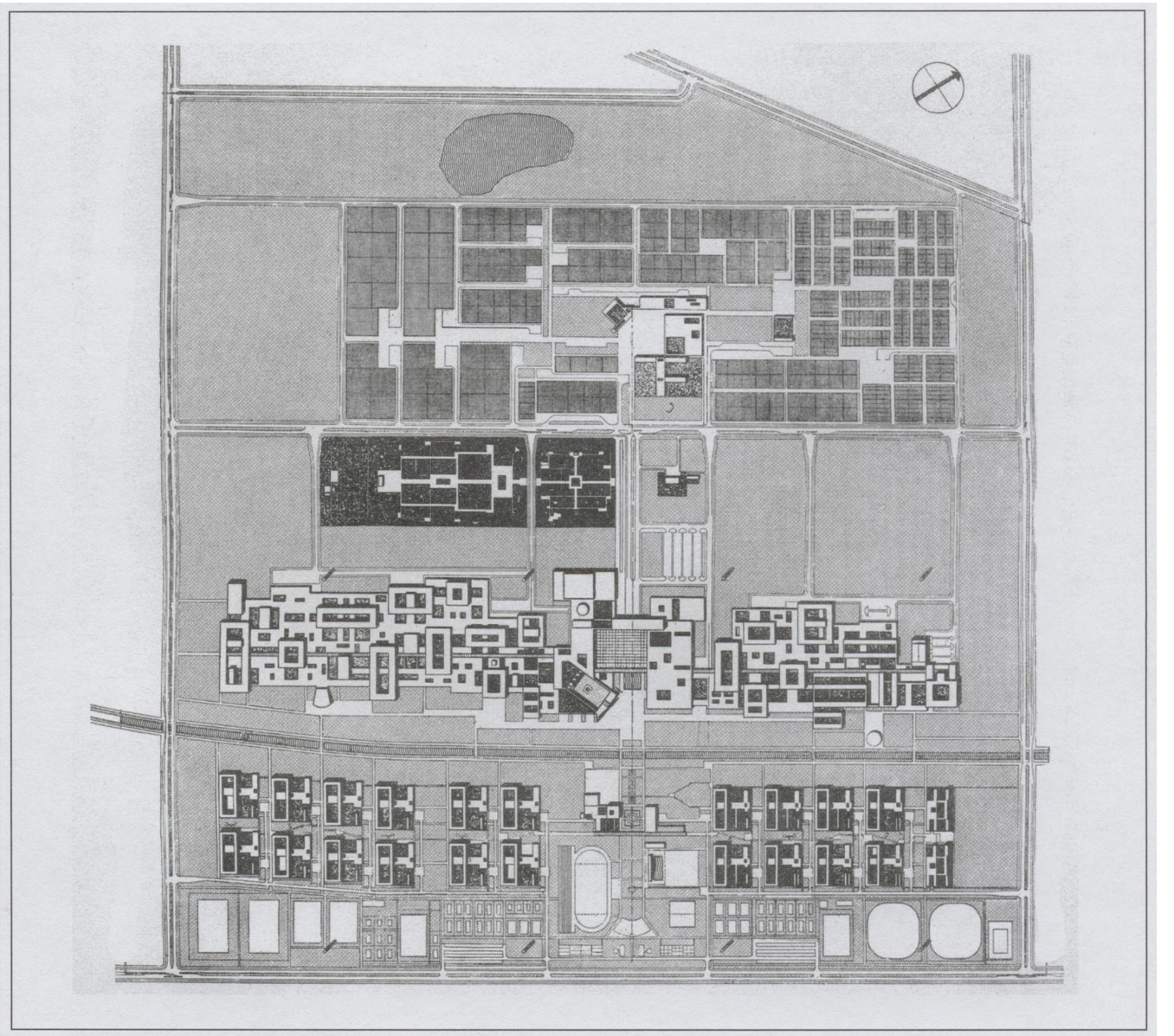


**Fig. 16:** General layout of the Punjab University.

## A microcosm of the whole earth

The human community should be a replica of the whole surface of the earth on a human scale. It should consist of natural landscapes, either pre-existing or to be remodelled – an artificial landscape can be even more beautiful and more satisfactory than a natural one (consider the ability of the Japanese to create ideal gardens). In such a landscape, man is going to find all his opportunities for daily contact with nature. In a community of this kind, children will run free with no fear of the machine, and then will become used to growing up into being the normal citizens of the world-wide city which they will enter after the nursery age. Just as the house is still the breeding ground for babies, the human community should be (he breeding ground for infants and young children.

Man will be in control of this community. His dimensions define the dimensions of the community, his walking-capacity defines the scale, his senses define the aesthetics of the community; architecture has a meaning, and landscape and works of art again have importance, because man is in rapport with them.

## The future city's natural cells

Society will find its shell in this human community. Although we shall have all types of communities in the city of the future – communities based on common interests, on education, and on the professions – the human community will give man in the city of the future the opportunity to re-establish the community of the neighbourhood. There is no reason to think that this should be eliminated, as it is being eliminated in the present-day city to the detriment of many social values.

Basic functions will be combined in the human community, as in the cities of the past. It will have its own system of transportation, based mainly on the concept of man circulating on the inner lines and machines only on the peripheral lines. It will be residential, and will have the corresponding services; it will have shopping, commercial, cultural, religious, administrative and recreational centres. It will have proper opportunities for employment (there is no reason why many places of employment, offices and small industries should not be incorporated into the human community, as they will not bother anyone) and leisure (parks, sports-grounds, etc.). Thus the major part of the needs of the inhabitants will be covered locally, so that they will have to go beyond their community only in order to find goods of a higher order. If these are available in the next community, they can walk to it by using a pedestrian bridge over the lines of transportation which, for a few more generations, are going to be on the surface of the earth before they are finally buried deep underground. If these services of a higher order are at longer distances, then man will be able to use the system of transportation that is going to allow him to travel to the other communities at a very high speed.

The form of this community will correspond, to a large degree, to the city of the past. Man will again find himself in dimensions to which he is accustomed and in which he has expressed himself for thousands of years in a certain way. He will probably follow many of the rules of the city of the past. He will emphasize public space, the small street, the squares and the central functions which will be expressed in more monumental buildings. This is an emphasis that has been obliterated lately by the invasion of the automobile.

It is in these millions of communities which will be the cells of the Ecumenopolis that man is going to re-establish democratic institutions on a very low level, by expressing his own desires, his own heart, through trial and error. In these great numbers of communities, man is going to create again the best type of habitat on a human scale. It is this habitat of man, the human community, the natural cell of the city of the future, that, by being properly interconnected with the other representatives of its kind, is going to form the texture which will cover the whole city. It is in this basic element that the life of man can be preserved and can be properly developed. This is why it is important that this community should be shaped at every phase, in every locality, by the people who are going to live in it themselves. This is the community of democratic expression and democratic life.

The city as a whole will be the result of good programming and planning, based on very careful calculations of man's needs and of the possibilities of modern technology. The universal city of the future should be, as a whole and as a frame, the product of the creative work of every able mind which can comprehend, and give shape to, the total habitat of man on this earth. The human community is the one in which the ordinary human being will find the opportunity to express himself in the best possible way.

In the past, the city plan was defined by the city authority, by the ruler. Man had the opportunity of expressing himself personally in his own architecture, by building with his own hands or by choosing his master-builder- In the future, organized society is going to take care of the universal city as a whole, and man is going to express himself in his own architecture and in his own human community. This is the great challenge for the builders of the city of the future; how to build the frame without predetermining the life of the man who is going to inhabit it. The objective is to leave him free to express himself within the best possible frame.

We are moving into the unknown. We do not know how man is going to express himself, but this is no reason why we should not build the proper frame round him. Otherwise, we shall be heading towards anarchy. We must build the frame. We must re-create the earth's skin which, in our forests, has been burnt, and in our hills has been cut away, and in our cities has been covered by a cancer. We have to build the frame of the universal city. How is man going to express himself within it? We do not know. We do not know whether he will create larger buildings, or will try to cover neighbourhoods or whole communities with a single structure, as Buckminster Fuller suggests. We only know that something like this may be dangerous, as it may gradually isolate man from the elements of nature, and this isolation may turn him into an inhabitant of the earth who is not interested in what happens outside his shell. We may have several ideas on the formation of the city of the future, but we must allow man to express himself in the best possible way according to his desires and according to the current phase of his evolution. One thing that we must not and cannot do is to allow this city to grow and to develop haphazardly, for then it will asphyxiate man. We have to foresee, imagine and develop the proper evolution, invent the right solution, and then build our city on the basis of these.