2. NO-COST HOUSING: SPACE AS A RESOURCE

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Summary

0.1 Compared to the scale of the housing demand in most third world urban areas, the resources nationally available are tragically minuscule. In India for instance, the income of 25% of the families will buy them about 2 M^2 of built up construction; the next 50% can buy upto 5 M^2 nor is it merely a matter of finance; steel, cement, and other material resources are also crippling constraints.

0.2 Yet space itself is a resource. Housing, after all, is much more than houses; it is really a system, a hierarchy of activities and spaces, ranging all the way from private family functions (like cooking and sleeping) to the principal community meeting place.

0.3 There are two vitally significant characteristics of the elements in this hierarchy; firstly, within each activity, there are trade-offs, (especially in warm climates) between spaces which are covered and those open-to-sky; and secondly, these activities are mutually inter-dependent within the hierarchy, and there can be spatial trade-offs between them.

0.4 Since residential building sites are usually only one element in total land use, these trade-offs can best be perceived in the context of the entire land-use allocation pattern. To begin with what we need is:

(i) A quantitative and qualitative appraisal of the hierarchy of spaces (both public and private) used by people in selected third world human settlements, in order to understand the trade-offs which occur within existing systems.

(ii) A model which investigates various land-use patterns and which, for different development and land values, optimises the total cost per house.

In working out these options, it is essential that a number of crucial elements are taken into account. For instance:

(a) The cost of service infrastructure, i.e. roads, water supply, sewer lines, etc.

(b) The cost of providing mass transport, which would of course vary with the densities, but also depends on the urban structure (e.g. whether or not it is linear).

(c) The construction cost of the units.

(d) Some weightage against using nationally scarce materials.

(e) Weightage in favour of such configurations and densities wherein it is possible to re-cycle human and other wastes (gobar gas plants, bio-gas plants, etc.).

1.1 Providing housing involves much more than just providing houses. The room, the cell, is just one element in a whole hierarchy of spaces human beings need in order to exist in a city.

1.2 This hierarchy is determined by many factors, such as climate, culturally-defined life-styles, and so forth. For instance, under certain Indian conditions, it appears to have four major elements:

(a) The space needed by the family for exclusively private use, such as cooking, sleeping, storage, etc.

(b) The areas of intimate fine-scale contact i.e. the door-step where children play, you chat with your neighbour, etc.

(c) The neighbourhood meeting places (e.g. in our villages, the village well) where you become part of your community.

(d) Finally, the principal urban area—e.g. the maidan—used by the whole city. A space to kick a football, fly a kite, hear a political speech.

1.3 Each element in this hierarchy can consist of covered spaces and/or open-to-sky

spaces. For example, many of the private activities at the micro end of the scale, such as cooking and sleeping need not be exclusively indoor but can — and do — take place in an open courtyard (provided of course that the family's privacy is reasonably assured). In fact, depending on the cost of building construction this trade-off is automatically adjusted — each society (and each family within it) finding its own balance. This adjustment is of the utmost importance, particularly in developing countries, because they are usually in warm tropical climates where a number of activities can indeed take place in the open.

1.4 The second important fact about the elements in this hierarchy is that they are mutually inter-dependent. That is to say, less space in one area can be adjusted by the provision of more in one of the other three. (For example, smaller dwelling units might be compensated by larger neighbourhood community spaces, etc.).

1.5 To re-cap briefly, we perceive housing not as cells in isolation but as a hierarchy of activities and spaces; secondly, these activities are mutually inter-dependent and there can be a spatial trade-off between them; thirdly, within each activity, there is a similar trade-off between spaces which are covered and those open-to-sky.

2.1 To identify the hierarchy and to understand the nature of these trade-offs is of course the essence of the task of providing housing. Without this, one is in grave danger of formulating the wrong questions. For instance, most attempts at low-cost housing perceive it only as a simplistic question of trying to pile up as many dwelling units, as many cells, as possible on a given site; with the result that in much of the Indian urban scene today, what we are observing is the desperate attempt of people—especially the poor—to try and somehow work out a pattern of living within the totally inadequate context provided for them. Recently, at the environmental conference in Stockholm, our Prime Minister said that in countries like India the most serious pollution of all was really poverty. And that statement can be extended — for it is not just poverty, but the particular forms which poverty takes in our urban areas. Rural poverty in India is a different thing. The people are as poor — often in fact poorer — but they are not as de-humanised. Obviously there is very little relation between the way our cities are built and the way people use them. Not having the proper range of spaces they need to live, people merely mis-use what they *do* have access to — hence the thousands of families cooking on pavements, squatting along railways tracks, and so forth.

2.2 And of course the tragedy is that piling people one over another does not in fact 'save' much land for the city. For in most urban areas around the world, only about 15% of land-use is devoted to residential building sites. The rest is in other space-extensive uses such as industry, warehousing, and so forth. For instance, transport is usually between 25% to 35% of land-use (higher in Los Angeles!). Even with the inclusion of local distributary roads, tot-lots, and so forth, housing occupies about a third of most cities. Thus we see that doubling the number of dwelling units on each site does not 'save' much land for the whole city (though it could mean much higher profits for the individual developer — which is of course the reason it gets done). On the other hand, halving the density on residential plots could mean only a marginally larger city.

2.3 Similarly, there are options involving trade-offs between different land-uses in the city. For instance, New Delhi provides about 1.5 hectares of open space per thousand people. (The figure is considerably

higher in London and most new towns around the world). Now 1.5 hectares per thousand works out to 15 M^2 per person —i.e.. Over 75 M^2 per family. Ironic indeed to think that families in Delhi — crowded into little hovels — each have over 75 M^3 awaiting them along some monumental vista —while the planners hesitate to provide them with 10 M^2 in a private courtyard which they could *really* use. ...

2.4 None of the fore-going is meant to imply that there are *no* high density residential areas. On the contrary, in certain sections of many third world cities, e.g. Bombay and Calcutta, the densities are extraordinarily high. But these densities are not achieved through high-rise buildings; no, they primarily result from the (criminal, omission of play spaces, hospitals, schools and other social infrastructure. For instance, in Bombay city, open space is about 0.10 hectares per 1000 persons — and this includes the 'green' of the traffic islands! Then again, road coverage is about 8% of land useless than a quarter of what it is in New Delhi (this goes a long way towards explaining the great crowds we see on Bombay's streets — as compared to the empty boulevards of Lutyen's Delhi).

3.1 But then the question arises: will lowering the densities increase disproportionately the cost of the service infra-structure? In particular of the travel time and travel costs, involved in the public transport systems. This is indeed an important question. Without transport there can be no mobility, therefore no job choice — in fact often no job at all — and for the urban poor, mass transport becomes as crucial a prerogative as housing.

3.2 Now a mass transport system — whether a tram, or a train, a bus in mixed traffic or on a reserved track — is essentially a *linear* function. It only becomes viable in the context of a land-use plan which develops *corridors* of high-density demand. The distance that a person is willing to walk to the transit station depends on the mode of transport and differs from country to country, indeed very often from city to city. Thus the cost and convenience of the mass transport system is not merely a function of overall densities, but depends also on the structure of the city — namely that it be a linear system, or a combination of linear sub-systems — with each station having a sufficient hinterland.

3.3 Let us take an example. In the case of Bombay, this hinterland per train stop averages about 8 to 10 minutes walk, i.e. a little under one Km. Within such a radius, and assuming a dwelling unit of 32 M^2 carpet area and a communal space at 30 M^2 per family (for tot-lots, health centres, etc. — the school play-fields and other space-extensive uses are just outside this area), we find that with five-storey walk-up tenements we can accommodate about 40,000 people on each side of the station. Ten-storey buildings (using elevators) would send up this figure to 55,000. On the other hand providing ground floor houses on individual sites (each 4 m x 11 m) would accommodate 25,000 people on each side of the station. (Density is not a direct function of the height of the buildings. This is partly due to the fact that the taller the buildings, the further apart they must be; and partly due to the social infrastructure area per family being constant at 30 M^2).

3.4 These variations in net residential density will not, as was pointed out before, make a great deal of difference to the overall size of the city; but they will make crucial mutations in the living patterns — really the life-styles — of the people. Furthermore, they can also make a decisive difference to the cost of constructing the dwelling units themselves. For again, in developing countries, there is a

great variety of simple materials and existing vernacular technology in which the ground floor house can be built — as for instance, brick-in-lime mortar walls with country-tile roofs, or even stabilised earth with a jhopra (palm thatch) roof. Furthermore, any open-to-sky space left on the site is really an extra room, obtained at no cost, usable at least three quarters of the year for essential family purposes. For instance, they might use 5 M^2 of this open-to-sky area for grinding masala, or sleeping at night; thus saving on the cost of constructing an extra room. And this of course, makes operative exactly the kind of trade-offs discussed earlier.

4.1 From the work we have done so far, it appears that in developing countries, these trade-offs decisively favour a pattern of low-rise medium-density housing. For there are a number of additional advantages; to wit:

(i) A low-rise building has a much shorter construction period. Thus the interest cost of capital tied up during construction is considerably less.

(ii) It is incremental, i.e. it can grow with the owners requirements and his earning capacity. Eventually, the owner may want to add an additional floor or two, either for rental or for his grown-up children's families. (This would have the additional advantage of increasing the housing densities; though it would entail a certain flexibility in the pattern of infrastructure provided).

(iii) It has great variety, since the individual owner can design and build it according to his own needs.

(iv) An individual building his own house is a highly motivated person; this motivation might possibly engender an increase in *per capita* savings — so that housing is built without sacrificing other national investment targets.

(v) It need not use high-priority construction materials. Multi-storeyed buildings must of necessity use steel and cement — commodities which are in excruciatingly short supply, in developing countries. On the other hand, the individual row house can be constructed out of anything, from mud on up. The recent advances in paper technology open up a world of new possibilities.

(vi) Of course, if the house in its early stages is constructed of brick, mud and country tile, then it will not have **a life** span of more than 10 or 15 years — as compared to an R.C.C. structure which will have a life span of, say, 70 years.

4.2 Of course it is one thing to be able to identify optimal residential patterns and densities; it is quite another matter for the authorities to be able to stabilise densities at these levels. This is of course the crucial question, and it is here that strategies must be developed, strategies which would, in all probability, involve the mass transport system. For instance, if we could use the transport system to open up new areas for residential use, we would in effect be subsidising low-cost housing indirectly through a subsidy on the transport system. This might well be preferable to a direct subsidy on housing, as that contradicts the actual value of the housing, and leads — at least under Indian conditions — to illegal transfers of the tenements.

4.3 In any case, one wonders whether the critical issue in third world cities is not so much a question of increasing densities, but rather one of lowering them. For instance if we can bring down the density in the residential areas to 80 to 100 persons per hectare, it may become feasible to dispense with a central sewage system and instead recycle waste matter (both human and animal) to considerable advantage (cooking gas, fertilizer etc.) under Indian conditions this would have the additional advantage of allowing the

people a pattern of life they are accustomed to. As though Mahatma Gandhi's vision of a rural India had an almost exact urban analogue.

5.1 In conclusion, it must be emphasised once again that the problem of low-cost housing is not one of finding new "miracle" building materials or construction technologies, but primarily a question of land-use trade-offs and allocations. We have squandered far too much time in a fruitless quest for architectural and engineering panaceas, when all along the planners have stated the problem wrongly to begin with. By Government count, a few years ago, there was a back-log of almost twelve million housing units required in our urban areas alone. To this must be added the four-fold increase in urban population expected over the next three decades. In contrast, our resources — both financial and material — are minimal. About 25% of our urban households earn less than Rs. 200 per month. The next 50% earn between Rs. 200 and Rs. 500. Even if we assume a rent-paying capacity of a quarter of this income (high by Indian standards for this income level), then, using brick and concrete, very little can be constructed for money — somewhere between two and five square metres per family — and this for 75% of the population! Furthermore, it is not merely a question of financial budgeting; there is not enough cement and enough steel in the country to deal with our millions of urban homeless in this way.

5.2 Yet, if we look around the country we find that indigenous towns and villages, people — without benefit of planners, or architects, or engineers — have always made marvellous and ingenious trade-offs between open-to-sky space and built-up construction, indicating to us a lesson of decisive importance: namely, that in a warm and tropical climate, space itself is a resource. It is imperative that urban planners in the third world begin to *use* it that way.