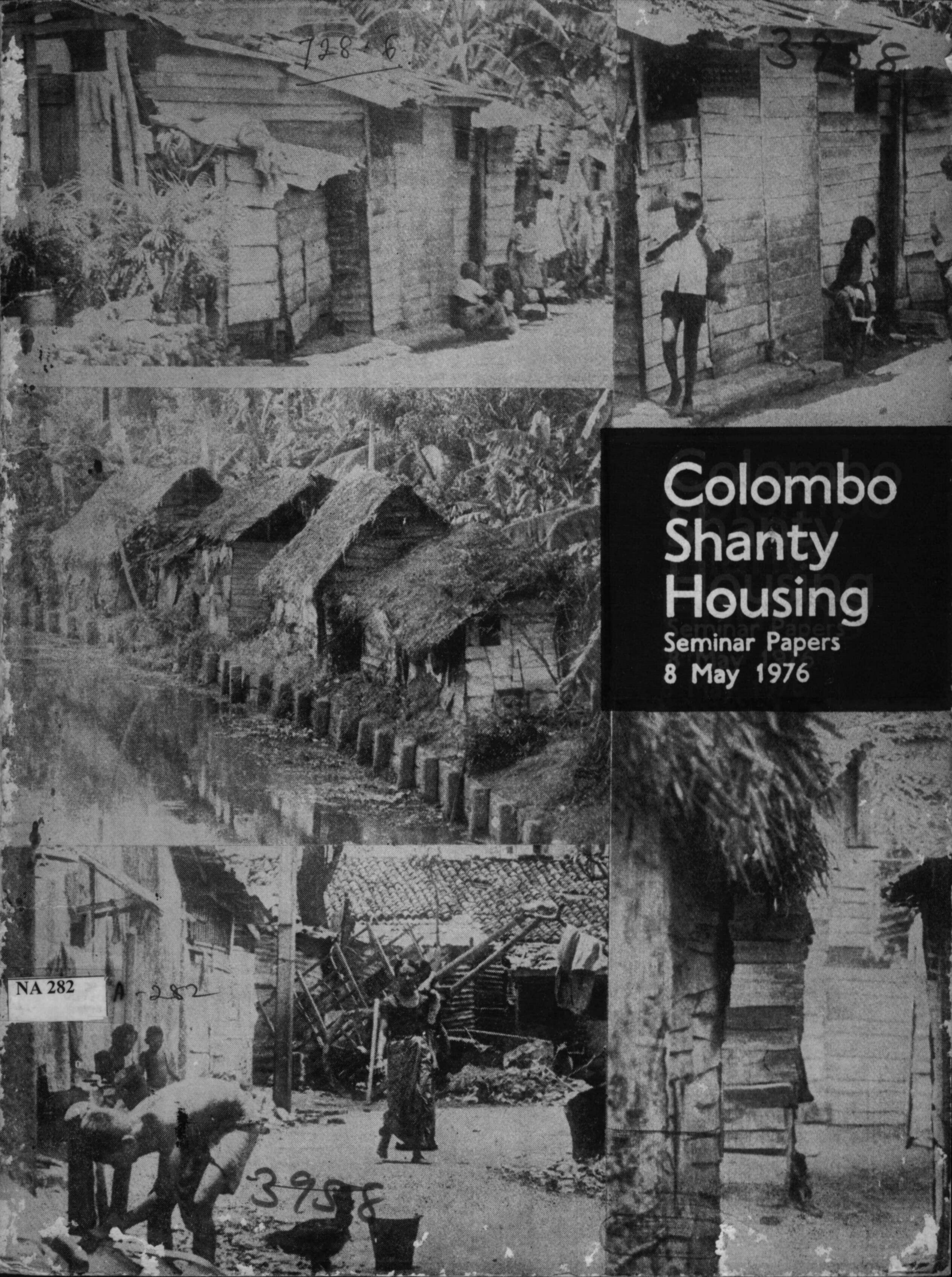

Colombo Shanty Housing

Seminar Papers
8 May 1976

3958

COLOMBO SHANTY HOUSING

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8th May 1976

Department of Architecture,
University of Sri Lanka,
Katubedda Campus,
Moratuwa,
Sri Lanka (Ceylon)

I N T R O D U C T I O N

This Seminar has been organized by the Department of Architecture at Katubedda Campus as a part of a Study of Colombo's Shanty Housing entitled 'Design for Low-Cost Living'. The Study is supported with funds from the National Science Council. Its ultimate objective is to propose a range of design solutions to the problems of Colombo's Shanty Housing.

The Papers in this Booklet will be presented and discussed at the Seminar and the remaining Papers and a summary of the discussions will be published after the Seminar. Further copies can be obtained from the Department of Architecture at Rs. 5/- each. Cheques*. We are indebted to the speakers who have prepared Papers and to all those who have helped to organise the Seminar, this Publication and the accompanying Exhibition and hope that this effort will ultimately lead to a better life for Colombo's shanty dwellers.

* should be made payable to the 'National Science Council of Sri Lanka'.

DESIGN FOR LOW-COST LIVING - PART I

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I consider it my task to outline in brief the background of this Seminar and of our Research Project in the Department of Architecture at the University. A sum of Rs.19,000/= has been made available to us for Research on "Low Cost Living" by the National Science Council of Sri Lanka.

This research topic grew out of a study undertaken by the Postgraduate students of the Department of Architecture. When we formulated the Research Project 3 years ago, it was complementary to two other studies, the first on "Low Cost Housing" by a committee set up at the request of the Ministry of Housing & Construction and the second on "the National Housing Situation" by the Marga Institute. Since then, a number of people have turned their attention to Colombo's Shanty Towns as is demonstrated by the Papers being presented here today.

Shanty Towns are almost world-wide. Over a third of Mexico City's population lives in the "parachutists' neighbourhoods"; nearly half of Ankara's population lives in "the over-night house-builders' Settlements" and over half the area of Kinshasha in Africa is "Outer Town" Colombo, the capital city of Sri Lanka, is no exception to this type of unplanned growth. A large portion of Colombo's population lives in shanties, that is, in temporary dwellings erected on land over which the dwellers have no legal right of ownership. These dwellers are a vital sector to the City and their problem is a social, economic and a human one which requires due consideration.

The formation of uncontrolled settlements has to be considered as a part of the phenomenon of urbanisation. The process of migration is irreversible but it should be contained and converted into a positive development factor instead of an impediment,

"Design for Low Cost Living" is a study of alternative design solutions to the living needs of shanty dwellers. The study does not pre-suppose that the solution is simply to build cheap houses. "Low Cost Housing" is a misnomer. Such housing schemes are generally too expensive for most prople and consist of small concrete boxes with inadequate services, ventilation and thermal properties and they inhibit social contact.

Studies of shanty towns have revealed complex social and economic structures in which such things as community spirit and class distinction, respect for property and landlord racketeering all play their parts.

The purpose of this study is to understand:-

(a) the patterns of living in shanties and

(b) the current planning problems

presented by shanty towns and to offer to architects and planners in Sri Lanka data that will assist them to make decisions concerning the future of shanty dwellers and dwellings.

Today's Seminar is an attempt to pool available knowledge that could throw light on this issue by the presentation and discussion of experiences and views in various fields of study. In this connection I must also draw your attention to the Exhibition of various types of material presented for your information in this Hall which I hope will stimulate your interest further.

Let me now outline the research work done by us on "Design for Low Cost Living" during the past 12 months for information and discussion.

Preliminary meetings with the officials of the Ministry of Housing, Local Government, Dept. of National Housing, Colombo Municipal Council, Dept. of Town and Country Planning Katubedda Campus, Dept. of Geography Colombo Campus, The Marga Institute, President of the Commonwealth Association of Architects and UN experts, Colombo Master Plan Project revealed little information on the local shanties. The only specific studies were by the

Municipal Council (which has made a rough count of the Shanties on State and Municipal land and guessed the number of people in these Shanties) and by the Ministry of Local Government (which is examining the feasibility of re-locating shanty dwellers outside Colombo).

We have collected information from the Aerial Survey Department in Colombo, the UN Centre for Housing in New York, the UN Environment Program in Nairobi, several University Departments in the U.K. and several individuals with experience in the field.

After the preliminary work by Post-graduate students of the Dept. of Architecture at Katubedde, it was decided to carry out a first detailed survey based on Wanathamulla Shanty Town between the Prison and the Oval. From visits and serial photographs, 5 Survey blocks were selected each containing about 50 houses, and covering the variety of housing within the Shanty Town. By ground survey, maps were drawn showing the layouts of the housing. This is probably the first time that such maps have been drawn and they show layouts quite different to other planned housing and are very difficult to survey.

Detailed plans were drawn of 60 houses showing space planning and use and elevational sketches were made of 20 houses. These drawings have now been selected and compiled into a first Research Booklet entitled "Portrait of a Shanty Town" which will be given to key departments and sold to individuals. This booklet indicates patterns of very low cost living to designers for the first time.

A Social Survey has also been conducted at Wanathamulla and the results are now being analysed by computer at Katubedde.

Following these Pilot Studies, we have begun a Colombo-Wide Survey which will be described by Dr. Doidge.

DESIGN FOR LOW-COST LIVING - PART II

Charles Doidge, B.Sc., M.Sc. (Architecture), Ph.D.,
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University of Sri Lanka, Katubedde Campus.

Mr. Rubert Peiris has outlined our Research Study and has described the Pilot Study of Wanatharulla Shanty Town. In this Second Part of our Paper, I will describe the Survey of Colombo Shanties and draw three preliminary conclusions in the fields of planning, Architecture and Sociology respectively.

Survey of Colombo Shanties

The aims of this Survey are:

i) to estimate the shanty population;
ii) to record the housing conditions; and
iii) to obtain more detailed information about social, economic and physical conditions.

Ultimately, we are committed to proposing a series of design solutions embracing the whole living environment.

This paper is based on a preliminary study of the data concerned with i) and ii) above. A Survey in June will concentrate on iii) above.

Using a large Aerial Photograph of Colombo prepared by the Survey Department to a scale of about 1 foot to one mile, and the 4-Chain Scale Ordnance Survey Maps, the area within the City Limits and up to about a half-mile beyond was divided into about 300 Survey Areas. An attempt was made to estimate very roughly the number of shanty houses from the Aerial Photographs but ground checks showed this method to be totally unreliable.

With the resources available, it was not possible to conduct a ground survey of the entire City but a sample of 40% of the

Survey Areas has been covered. In each, the number of Shanty Houses were counted and 250 scattered throughout the City have been measured and drawn. Certain Shanty Towns have yet to be counted and 5 Survey Areas where there is Cholera will be surveyed when the epidemic is over.

The number of Shanty Houses counted and estimated so far is over 13,000 representing a population of over 85,000 and the eventual figure is likely to be over 100,000. This represents 15 to 20% of the City Population.

Planning and Scale

Current planning principles still designate certain 'Residential Zones' and specify standards of hygiene, construction and services. This Survey shows what is already apparent, that a significant proportion of Colombo's inhabitants live in areas not designated for housing and in houses below the specified standards. There may well be another 20% of the population living in slums which have not been included in this Study.

The scale of this 'Law-breaking' indicates that either the housing or the planning principles, or both, are wrong. Traditionally we blame the shanty dwellers, condemn their houses as insanitary and their towns as dens of vice and talk of new flats and relocation outside Colombo. But I believe that Town Planners have applied Western concepts to Eastern towns and failed to recognize the significant changes of the last 30 years. I would like to illustrate this by reference to Chandigarh.

The City of Chandigarh is in India about 300 miles North-West of Delhi. It was built in the 1950's and acclaimed by Town Planners and by Architects as a masterpiece and model. Every architectural student in the West is taught its Town Planning principles and shown photographs of its major buildings. But it is actually a sprawl of middle and upper income-group housing with a huge shanty town on the outskirts. The 'achievement' of the planners has been to keep the City clean and

the shanties out but the need of the City is to employ people of all income groups. The Secretarial Building is backed by boutiques and little canteens in bicycle sheds and huts.

We talk, and perhaps dream, of equality but it has not yet come. The Cities of East and West rely on people with a great range of abilities, responsibilities and incomes. We are now faced with a clear choice as planners. Either, we can drive Colombo in the direction of Chandigarh or we can recognize a new problem in planning - that in a City, rich and poor are entirely dependent upon one another and, as the poor are too poor to commute, the City must be zoned to allow the poor sufficient areas near the centres of employment in which to live. The traditional objection is that urban land values are too high but I suggest that this may be the most economical use that can be made of certain central areas when you take into account the essential services the shanty dwellers provide. They should be given their due rights and not simply labelled 'illegal encroachers'

Architecture and Variety

The contrast between architects' architecture (and perhaps I should include engineers' engineering) and people's 'unplanned' building is alarming. The illustrations shown by Mr. Pieris indicate the variety of the environment in a shanty town but we seem to have inflicted monotony and debt.

Low-cost flats in Sri Lanka currently cost around Rs.40,000/= and aided self-help houses about Rs.5,000/=. In contrast, a shanty house costs around Rs.400/= or is rented at around Rs.15/= per month. There is not enough money to build flats for the World population, whoever pays, and aided self-help housing will only go a small way. Even at such high prices, flats are proving inappropriate to Sri Lanka. By contrast, shanty housing allows most activities to take place outside and provides a great variety of outdoor spaces. Our first Research publication, 'Portrait of a Shanty Town' contains drawings

illustrating this variety and we hope that this will convey something of the planning possibilities.

Sociology and Complexity

We tend to think of shanty dwellers as a single class of poor people. I believe that it is this misconception that is at the heart of our wrong attitudes and hence, our wrong solutions.

We might expect most shanties to be of a similar size the 'average' or 'Ideal' that everybody talks about. But the size distribution varies from 6 to 30 square metres (60 to 300 sq. ft.). Size is not related to family size and large variations in house size and in land 'ownership' can be found side by side.

This suggests a wide distribution of wealth and power within the shanty communities and indicates that the shanty dwellers are not one class but a complex urban community. They demonstrate many of the characteristics of those living in permanent housing with two differences - first, they are generally poorer and second, the house is not such a crucial part of their status and life-style. The society apparently includes those who are industrious and capable as well as those who are desperately poor.

Conclusions

This is a brief Paper drawing a few preliminary indicators from largely undigested data recently collected. It has attempt to identify the areas in which solutions might lie. I have suggested that planners must now consider shanty housing as an essential element and seek to improve and integrate it rather than to eradicate it. I have suggested that Architects should seek to understand and capture the spirit of shanty towns within more hygenic settings and that shanty dwellers form a complex society which includes capable and industrious people.

If this is so, we are imposing our solutions on those who are more capable of solving their own problems. To build a house, we need land, services and a little advice. I suggest that the shanty dweller needs no less but no more.

VARIOUS METHODS OF APPROACHING THE URBAN SQUATTER PROBLEM

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Colombo Master Plan Project

(An introduction of selected Action Programme Strategies being pursued in different countries to solve urban squatte problems)

1. Planned National Development – Integration of urban in – migrants (Israel)

2. Assimilation through urban re-develcpment programmes (India)

3. Housing policy to accommodate urban squatters (Hong Kong)

4. Land and Utility projects for urban squatters (Peru)

5. Community Development Techniques applied to squatte rehabilitation (Columbia)

6. Recuperation of urban squatte colonies (Brazil)

ANALYSIS OF HOUSING STRESS IN COLOMBO.

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ACKNOWLEDGEMENTS :

This paper is based on research on housing in urban developments carried out by the Extension Service of the Development Planning Unit, University College London. The methodology has been applied, as part of a course for housing officials and students of architecture and planning, in the cities of Bombay, Chandigarh, Bangkok, Baghdad and Nairobi.

The material on Colombo is taken from a study of housing in Colombo carried out as a first project by the students on the M.Sc Course in Town and Country Planning at Katubedde Campus, University of Sri Lanka in August 1975. The students taking part were as follows :- D.S. Withane, S. Epittawatta, L.D. Dickman, S.A. Rajakaruna, W.A. Siriwardene, K.D. Fernando, G.L.D. de Silva, A.L.B. Lankatilleke, M.H. Pavey, R. Samarawickrama, N.G. Karunaratne, A.L.S. Perera, Miss N. Herath.

INTRODUCTION

The problems of housing and employment are the two greatest areas of challenge to the Governments in developing countries. Officials in housing Ministries and those in local authorities responsible for housing have seen the solution to the problem in the production of more 'houses'. This solution has been largely influenced by their own middle-class backgrounds and prejudices. The result has been the erection of a small number of expensive and very often unsuitable flats and houses. Pressures to reduce the cost of these 'low-cost' units have resulted in already low space standards being reduced even further.

Very few people can give an answer to the question, 'How many housing units will the city need in the next ten years ?, and those who can, quickly forget when they realise that their budget for housing divided by the cost of a house comes no where near this figure.

No city claims to have solved its housing problem, but many cities can come much nearer to this goal if they try and respond to the needs of their clients, the people who require housing.

All 'low-cost' housing is subsidised. The eventual occupiers are so often lower-middle income families, who have regular employment and are skilled workers. These are people who can often contribute to solving their own housing problem, through the use of their skills, if not their money and so considerably reduce the amount of money they receive. The poorest of the poor, who have no regular income and very few skills and who must be subsidised, are largely ignored. The solution to their problem is seen as giving them yet another temporary permit for their shacks as housing schemes for other people drive them away from their existing locations.

The houses and flats that are built, take little consideration of the range of household sizes of their future occupants and all too often assume that every family has four or at the most five members. In every developing country, families in the lower income group need for their survival to be close to arrange of casual employment opportunities, and these are only found in the centres of cities. They also need to be able to supplement their income and diet by such means as selling prepared foods, carrying out small scale repairs, keeping chickens or growing vegetables. The traditional response is to build houses away from the city centre and not only not to provide space for casual activities but often to specifically prohibit them.

To summerise, the solutions to the housing problem have been seen as the erection by public authorities of houses and flats, which are too expensive, which are too few in number, which do not meet the needs of the future occupants and often result in the poorest of poor being totally ignored. Little attention has been given to the contribution particularly in terms of skills that the future occupants can make and in doing so, reduce the cost to the public authorities and thereby increase the number of housing units they can provide.

THE HOUSING PROCESS

In order to improve on this situation, a client-orientated housing process has been developed. The aims of this are to produce strategies, which respond to the needs of the future occupants of the housing; which maximise the use of existing resources of both clients and public authorities; which considerably increase the number of housing units that are produced and which ensure that the subsidies that are given go only to those who have a real need.

The housing process is divided into three main stages, ANALYSIS, SURVEY and DEVELOPMENT OF STRATEGIES.

The ANALYSIS stage includes an assessment of the magnitude of the problem. Estimates are made of the number of households that are likely to be formed in the next 10 or 20 years, the existing rate of housing production and from this the additional housing units that will be required to meet the needs of the future population. The economic analysis relates the distribution of household income to the cost of houses on the assumption that they are financed through existing loan schemes. The results of these two stages indicate the housing targets and the percentage of households in the city that are not able to afford the housing at present being provided.

The locational analysis identifies areas where the land is predominantly used for housing and the housing stress map will show where the worst conditions prevail. The part is discussed in more detail later.

When the worst areas of housing have been indentified a SURVEY. can then be carried out in these areas. In this way, the detailed information required for the development of housing strategies the client groups who are in most urgent need of attention can be gathered. The alternative, attempt to carry out a socio-economic survey of the whole city both takes too long and often gives meaningless results due to the small sample.

The next step is the identification of the client groups, and from the results of the survey, the formulation of a clients housing brief. As one cannot have a housing strategy for each household it is therefore necessary to aggregate the households with common characteristics and housing needs. The usual way to do this is to group the households according to income as this directly affects their ability to pay for housing and, it has been found, their priorities for space, services and location.

THE DEVELOPMENT OF STRATEGIES involves the generation of ideas through a group 'brainstorming' session, and these ideas can then be classified according to the level and field of operation in an 'ideas bank'.

The level of operation refers to whether the idea relates directly to the household, or at the other end of the scale, affects national policy. The field of operation refers to political, legislative, financial, administrative, technical or the executive fields.

The classified ideas are grouped into strategies, which are then phased in a flow chart diagram. These strategies can be evaluated against the client's housing briefs, before decisions are taken on implementation. The last, and most crucial part is the monitoring and information feedback from the implemented projects.

THE HOUSING STRESS MAP

The locational analysis and the resultant housing stress map, is one of the most important steps in the housing process and is essential to the comprehension of the housing problem in the city. Most people are familiar with the apparently worst housing areas, such as eye-catching squatter settlements and they will probably know where the richest or most influential people live. Few urban authorities have information on exactly how bad all the housing facilities are in the 'worst' areas or even the location of all of them. Often people live under intolerable conditions but their plight is not realised because the fabric of their dwellings is not dramatically indicative of their lack of space or facilities.

The locational analysis is a simple reconnaissance survey tool for the preparation of a series of housing area characteristic maps and for their combination into a housing stress map. This map is not a substitute for a survey of actual user demands in a 'client oriented' approach to urban housing, but it is an aid to identifying the major categories of client groups for housing and their probable location throughout the city.

Indicators of housing stress are not only factors which describe the physical condition of the buildings, but also indicate density and occupancy rates availability of services and access to amenities.

The stages of developing the housing stress map are as follows :-

1. Construction of a grid over land use map of the city.
The purpose of this excercise is to identify the areas that are predominantly residential and to exclude the other areas from the process. A grid has been found to be the best way of bringing together all the indicators of housing stress onto a common basis. In most cities a grid of 1 km. square gives reasonably accurate information and a small enough number of squares to be effectively handled manually.

2. Agree a range of scores for the indicators. The quantifiable information for each indicator must be scored, the highest score being given where there is the greatest housing stress. For mathematical simplicity it is usual to score from one to five.

3. Plot indicator scores on grid map.
A seperate map is prepared for each indicator, the scores shown by colouring of shading. This step is important as it is often necessary to dis-aggregate the housing stress map and identify the factors which contributed to the housing stress in a particular area.

4. Complete housing stress score chart.
The scores for each indicator are then transferred onto the score chart against the relevant grid reference.

5. Agree weighting factors for each indicator.

If the scores for each indicator are added up and the total figure used as an indicator of housing stress, it assumes that each indicator is of equal importance. This is obviously not so, and it is therefore necessary to place the indicators in an order of importance and then give each a weighting factor, which indicates their relative importance. It is usual to weigh the factors out of a total equal to the number of factors taken into account, although not every number in the series will necessarily be represented. In order to reduce the subjectivity as many people as possible should take part in this operation. The weighting factor for each indicator is then multiplied by the score for each grid and the result added to give the housing stress score.

6. Preparation of housing stress map.

The housing stress scores can now be grouped, usually into five categories and presented on the grid. The grids with the highest scores being those of greatest housing stress according to the indicators chosen and the weighting given.

HOUSING STRESS IN COLOMBO

As their first project in July 1975, the students on the M.Sc. Course in Town and Country Planning at Katubedda Campus prepared housing strategies for the city of Colombo.

Fifteen indicators of housing stress were taken into account. The actual indicators chosen were to a certain extent influenced by information that was readily available, but a wide range of indicators were included. They were as follows :-

1. Population density.

Information on gross population density was obtained by Ward from the 1971 Census and this was then transferred onto the grid map. The highest density of 286 persons per acre was found in Aluthkade West Ward and seven other Wards had densities over 150 persons per acre. The map indicates the very high densities prevailing to the north-east of Pettah particularly when one considers that there is a mixture of uses in this area further reducing the area available for housing.

2. Percentage of shanties.

This information was based on the Relieving Officers Estimates for 1974, which gave the number of shanties on Crown and Municipal Land, according to Ward. Estimates of the number of dwellings in each Ward were taken from the Municipal Assessors' Lists of 1975 and the number of shanties taken as a percentage of this figure. The highest percentage of shanties were found in Borella, Wanathamulla, Mahawatte, Modera and New Bazaar areas.

3. Condition of Buildings.

A 'windscreen' survey was undertaken covering the whole of Colombo as there was no statistical information on this important indicator. Although the method used, driving round each grid and giving a score, was very subjective, the results were surprisingly good and compare well with, for example, the information on shanties. The worst areas were Kotahena, Mutuwal, Modera, Grandpass and Slave Island.

4. Connection to main sewerage.

Information was obtained from the Colombo M.C. Engineers Department and the W.H.O. Report of 1972. This gave the percentage of the population by Ward who lived in houses connected to the main sewerage system. The northern and south-eastern parts of the city scored highest for this indicator, where less than 40% of the population lived in houses connected to the mains system.

5. Access to transport facilities.

The Operations Division of the C.T.B. provided information on bus routes. Grids which were over five minutes walking distance from a bus route were given the highest score. Although the map gives no indication of frequency of services, most places are very well served by public transport.

6. Connection to mains electricity.
The Electricity Board Revenue Branch gave information on the number of houses connected in the fifteen zones in Colombo city. This was then taken as a percentage of the total number of dwellings in the Municipal Assessors Lists. In Slave Island and the North east of the city less than 20% of the houses have mains electricity.

7. Access to Cooperative and Authorised Dealers. Access to essential and frequently used shopping facilities was taken as an indicator of housing stress and the distance for scoring was calculated on the basis of a reasonable distance for someone to carry heavy shopping. It was found that almost all grids were within $\frac{1}{2}$ mile of these facilities.

8. Access to primary schools.
The location of all the primary schools in the city was mapped and the scoring was based on a reasonable distance for small children to walk to their school. Most areas were found to be within $\frac{1}{2}$ mile of a primary school.

9. Number of standpipes.
It was not possible to obtain information on the number of houses connected to a mains water supply and therefore the presence of standpipes was taken to indicate a lack of direct house connections. Grids with over ten standpipes were given the highest score.

10. Access to Municipal Markets.
Municipal Markets are frequently used centres from where people are likely to be carrying heavy bags. The highest score was given to grids over $\frac{1}{2}$ mile from the Municipal Market. The whole of the eastern side of the city is relatively poorly served, but the picture is distorted by the presence of popular private markets in this area.

11. Access to Government Western and Ayurvedic Clinics and General Hospitals.

The majority of the households were within ½ mile of these facilities and although their use may be infrequent ease of access is important in an emergency.

12. Land liable to flood.

The Land and Irrigation Department, provided information on land subject to minor floods and those areas affected by extensive annual flooding. Although only areas in the north-east of the city are affected it is an important indicator of housing stress for the people affected.

13. Access to public open spaces.

Most areas of the city are within ½ mile of public open space, although the size of the space, particularly in relation to the population it serves was not taken into account and it may well be that the actual area is inadequate.

14. Access to religious facilities.

The types of religious buildings such as temples, mosques and churches were plotted on a map of the city. The predominant religious group in Ward was also found and the distance from the appropriate religious building calculated. Most grids were less than ½ mile from the facilities.

15. Noise pollution.

Grids within 50 yards of trunk roads, which carry a heavy lorry traffic were given a high score for this factor.

The planning team then weighted the indicators, according to their relative importance as an indicator of housing stress. The results of this weighting exercise were as follows:

Population density	14
Percentage of shanties	13
Condition of buildings	12
Connections to mains sewerage	11
Access to transport facilities	10
Connections to mains electricity	9

Access to Co-ops and Authorised dealers	9
Access to primary schools	8
Number of Standpipes	8
Access to Municipal Markets	8
Access to clinics and hospitals	7
Land liable to flood	5
Access to public open spaces	5
Access to religious facilities	3
Noise pollution	2

The resulting housing stress scores were then calculated and plotted on the housing stress map. Maligawatte, Henamulle and Grandpass had the highest scores of over 400. Some of the central areas such as Slave Island did not score so high as they had relatively good access to amenities and services.

As a result of this housing stress map four areas, namely Henamulle, Maligawatte, Grandpass and Slave Island were selected for detailed socio-economic surveys. Slave Island was included so that information could be gathered on a central area site for comparative purposes. It is important to remember that the factors selected were those thought to indicate housing stress by the planning team. The analysis of the survey when the clients opinions were found produced results which did not always agree with this. For example, connections to mains water supply (The lack of which was indicated by the number of standpipes) was given a very high priority by our clients, although it was only given a score of 8 by the planning team.

In conclusion, a housing stress map is a useful analytical tool which can help us identify quickly the worst areas of housing on the basis of readily available information. We can take into account not only the condition of the houses but also access to services and amenities. It can help us identify those areas where immediate action is required to improve housing conditions and the provision of services and amenities. However the development of strategies must depend on the clients' needs which can only be found out from an actual survey.

A SOCIOLOGIST'S VIEW OF SHANTY LIFE & ITS IMPLICATIONS ON HOUSING DESIGN

Erika Dias, B.A. Mass. U.S.A., Demographic Training and Research Unit, University of Sri Lanka, Colombo Campus.

The shanty people have to face a number of challenges in the urban environment in which they live. They are alienated from the main stream of urban living. The informal organisation of the "preference - relationship" net-work based on kin-group and class heirarchy systems of the urban society provides no place in the main-stream for the slum and shanty dwellers. This "preference relationship" system is away of getting things done for each other by those in the net-work. Through this contact system which gives preference to some of the kin-group and friends to have access to urban opportunities, facilities, and services such as educational, health, housing, welfare services and so on, they can obtain the maximum benefits from them. But this informal sociologieal phenomenon of "preference relationship" functions in a way that it alienates the shanty dwellers especially from the contact net-work. Very few of the shanty dwellers are fortunate enough to be in a work place where this opportunity is prevalent. As a result their chances of getting the maximum benefits from facilities and services the State provides, irrespective of income differences or job status, is limited. The built in negative shanty environmental conditions further alienates them from the main-stream of urban living. Tiny, dingy houses in which they live, without sanitary toilet facilities, water service, and basic equipment such as proper lighting, and very often their damp floors prevents them from leading a healthy family life. Very few can face the environmental challenges and survive the vicissitudes of the system and benefit from the facilities in the urban main stream.

From their uninspiring environment they assimilate social norms and values which are not conducive to the high demands of the urban middle-class environment. The middle-class norms of postponing immediate satisfaction and sacrificing the present needs for future benefits are not built into their presonality structure. Immediate return and "knowledge of results" is important to them. The parents' attitude is also not to inspire their children to aspire to higher future goals by encouraging them to remain in the school but to encourage them to supplement the family budget by odd jobs. As a result from a very young age they get cought to the vicious cycle of growing old in poverty without the opportunity of acquiring long term skills.

Equal access and opportunity to educational facilities through the area rule has meant little to them. Socially and environmentally the challenges are insurmountable. The shanty children cannot compete with the well clothed, well fed, well equipped, well tutored (in the appropriate environments) middle-class child and they drop out of the school system-only 3% pursue up to the G.C.E.O'Level. 1. As a result the children have not assimilated the urban class characteristics and like in the rural areas the search is for immediate gains. In a negative environment quick results are attractive and gives those in it confidence to meet the negative forces and frustrations they have to put up with daily. When questioned as to why the shanty dwellers like to remain in the area, very few mentioned the schooling as an advantage. The reasons given are the proximity of other facilities such as markets and hospital services. 2. Given this attitude it is not surprising that the shanty system perpetuates and expand without any attempt

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1. Perera N.B., Report on the Shanties, Colombo Municipal Council, 1973.
2. Department of Architecture, Katubedde Campus, University of Sri Lanka, Shanty Town Survey (initial stages).

of those in it, at least the younger generation, to make the maximum use of educational facilities, aspire to higher jobs and move out of the area to better living environments.

In examining the housing designs in the shanties it is important to find ways and means of improving their houses and physical environment without unduely disturbing their way of life and take into consideration the limited incomes, material and environmental facilities in the areas. If physical and environmental changes are to be effective it is important to work within the means of each individual situation. If service improvements in the shanties are to be made by the Urban or Municipal Council or the Common Amenities Board the Ministry of Housing, it will be useful to make an initial study of the area and take into consideration the special characteristics of the area. Changes will therefore envisage priorities and adjustment abilities of the people in keeping to the peculiarities of the social and physical environments.

If we take the total environment of the shanty dwellers, there income sources, job structure, parental aspirations, child training and child rearing practices, living habits, slending habits, cohesive community life, extended family life patterns and dearth of resources, spice and material, we see that the housing design is a reflection of all these characteristics. It is within each individual's limited resources and habits that we can make suggestions for improvements.

If certain attitudes and aspirations are not prevalent we will take it that they are no prevalent not because of a lack of appreciation for them but because the shanty dwellers easily give into the negative forces within the environment. If we can find means of inspiring them to retain their aspiration to meet the daily challenges and not only survive the system but be successful in it, we would have been of some use.

Relation of educational aspirations through housing design:

If we can, to some extent, get across to them the idea that they must inspire in their children the necessity to continue in school, if they are to make maximum use of educational facilities, and also convey to them the advantages they enjoy in terms of proximity to good schools and educational institutions, for which middle-class parents are willing to sacrifice a great deal, then we would have achieved a major part of our task.

One way of emphasising this importance is by helping them to improve their housing conditions by providing to their children a secluded corner in their house as a study. Most often the dingy, dark wooden shanties keep the children in the streets and alley ways. The close community living and the street system keep them away from their books. The severe housing conditions make their houses less attractive to work in, especially educational matters which requires quiet study and concentration. From such situations it is easy to be distracted by the hub of life at the doorstep or street. Children, especially, the boys spend their time on the streets andeven sleep in the night in the open streets.[3]

There are a number of ways in which the parents could convert a corner of their house as a study for their children. If the house is not dingy and light comes into the house through a window, the corner closest to the window could be converted to a study which could take the least amount of space. The triangular corner could have a few triangular shelves for the books, and below these shelves, at a convenient level, a broad triangular plank could be fixed, on one side with hinges and on the other side by hooks so that it is detachable when it is not in use. (see Figure 1)

Where the house is dingy and dark inside it is possible to find a corner outside along the side of the house. Very often in a thatched roof house the eaves extend to about two feet and provide for relaxing in good weather. A corner in the back of the house could be converted into a small study by a few additions (See Figure 2)

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3. Jayasuriya J.E., and Sundari Kariyawasam, Juvenile Deliquecy as a Gang activity in the City of Colombo, Ceylon, Journal of Historical and Social Studies, 1958, p. 204.

In a conjested area for more seclusion and privacy the same structure modeal could be used but with one difference, the study to be constructed just before the roof level with a ladder to climb into the study. Here it is anticipated that the house would have high walls (See Figure 3).

Providing for education in the housing design is extremely important as a long term policy measure. It will break the vicious cycle of growing old in poverty and encourage the young people to make the most of educational opportunities provided to them by the State and eventually move out of the areas to better living environments via higher job status. With their new positions it could be easy for them to enter the main stream of urban living and the net-work of "preference relationship".

Retention of extended family life patterns through housing design:

In urban living it has been found that the nuclear family will survive better in situations where the vertical extended family pattern prevails. That is, where the children live with their parents and grand-parents or elderly relations (three generations) and not the horizontal pattern with siblings and their families living together, that is, the same generation. In the shanty areas where parents need to leave their children by themselves constantly - very often a young sibling as young as nine years will look after the younger siblings - it therefore becomes necessary for concerned elders to remain in the house with the nuclear family.

A housing design in the shanties should try to accomodate the Kin - group members. When privacy is needed by the conjugal couple (or by the growing children), and to make the most of the limited space it will be necessary to partition off through curtains, screens or jute - hessian material. Most houses are continuous floors with such partitions but to make it appear less conjested, for better ventilation, and to permit day light to come in, it may be better to have a system of curtaining which can be drawn when privacy is needed.

Retention of cohesive family life patterns in housing design:

In contrast to urban middle-class areas where the inter-personal interaction is at a minimum, in the shanty areas there exist close-knit interacting patterns of life. It depicts well developed patterns of community living which are positive characteristics to be preserved. The interpersonal interaction cut across religious, ethnic, regional, age and class differences in the shanty areas. At the micro-level taking only interaction and thereby intergration it is closer to the ideal concept of cross cultural intergration. Any improvement programme should not try to disrupt this pattern but enhance it and when appropriate these positive responses should be utilized by community action programmes.

In the rural areas the social behaviour pattern is for men to meet in the verandahs of houses, and women folk to meet to inside the house in the bed rooms and kitchen, while the children will play outside in the garden. This social interaction pattern continue in the urban shanty areas except that most houses do not have verandahs and men meet at the doorstep, alley ways, street corners, and under trees. When there is social gathering culturally, segregation of sexes among adults is common place and there is no necessity for all the family members to meet in one place except for brief moments, but where families live in a cluster pattern in a community not seperated by fencing and very close to each other, constantly confronting each other, them common meeting places such as common verandahs or canopy type simple roof structures to meet, communicate and be sociable will break the social restrictions of the area. In heavily congested areas where at least 25 square feet of vacant space is not available for canopy like structures, it may be necessary to find verandah space a round the house where the eaves can be extended to shelter two or more persons to have face to face (primary) interaction. Our experience in apartment living shows that unless there is space in the baloonies for face to face interactions these verandahs are not used for social interaction. It will be useful to popularise furniture like small stools and folding chairs for them to meet under canopy roofs, extended eaves or under trees.

If there are trees and verandahs the men folk use these places for gambling. A more healthier interaction will take place if it is possible to promote the informal leaders to initiate community interaction of all ages and sexes and make them meet under the canopy roofs and common verandahs constructed for this purpose.

Improvement of toilet facilities and water service:

Two essential service that the majority of shanty dwellers are in dire need are latrines and water service. Sharing a latrine by more than two families is not satisfactory in Sri Lanka because of low priority given to toilet training in child-rearing practice and lack of civic consciousness of maintenance, careful use and appreciation of common facilities. What would be ideal is for each household to have a separate latrine. Fortunately in most shanty areas there is still enough space between houses to find space to build latrines. However, in heavily conjested areas such as parts of Wanathamulla, Panchikawatte, and East Pamankade providing common latrines is the only alternative, orelse space could be found by shifting part of the population to new housing environments such as Aided Self Help schemes, which we have tried to avoid suggestig up to now. The Municipal Council is prepared to assist, with free squatting pans and a certain proportion of the finances, those who are willing to construct their own latrines. However, as the land on which their shanties are built are not owned by them, and the shanties are unauthorised buildings which could be demolished at any time, the shanty dwellers are not motivated to spend their limited funds on latrine construction. Improvements through latrine construction will have to await major policy decisions by the State such as whether the shanties are to remain in the areas or not.

Water from taps or wells is the other urgent basic need for the shanty dwellers. Nearly fifty families use one water tap on the roadside.[4] There are peak hours when water taps are most used by the families.

In conjested areas rural type wells will not be hygenic. Water from wells seem to be the most suitable for our culture where the people are happy to meet and share the water that is abundant and engage in pleasant tasks of washing, bathing and communicating.

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4. Perera N.B. Report on the shanties, Colombo Municipal Council, 1973.

A combination of these tasks comes without effort. But where it is conjested it is necessary to device a more sophisticated means of sharing water. The streetside type of water taps, with pipe-lines laid underground, will not be feasible in a conjested shanty area with haphazard cluster pattern of housing. It may be necessary to build a water-tower over the shanties from which a number of flexible and movable pipe-lines, such as made of alkathene, originate and are distributed over the shanty roofs and placed between the houses in the alley ways. Taps should be fixed to the end of the pipes so that they could be closed when they are not in use (See Figure 4).

Self-reliant community nursery centres:

It will be necessary to inspire the informal leaders in the area to get together and run a nursery for the toddlers and infants in the area. There will be a number of adults in the area who are not usefully occupied who could earn a few rupees by organising a nursery. The Municipal Council could extend a loan initially to equip the nursery with the basic materials. The nursery could be housed in one of the organiser's shanty unit. Very often young mothers need the nursery service only for a few hours - time enough to attend to the usual chores such as waiting for the tap water or waiting in the queue in the cooperative.

A workshop to turn out the basic needs of the shanty dwellers:

The Charity Commissioner 5. has already initiated vocational workshops on sewing and tailoring, book binding, carpentry and rattaning, and cookery and catering services, in some of the shanty areas. It will be useful to extend those schemes to incorporate workshops that will turnout simple equipment that are used by the shanty dwellers and those items appropriate for them such as folding chairs and beds, shelves and collapsible desks from cheap woods (such as packing case wood), bottle lamps with safety devices, roof and wall materials (collection and preparation), and nursery equipment and the like. Such workshops will be an asset to the area as

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5. Charity Commissioner, Colombo Community Development Society, Project Document.

they are directly related to the way of life of the people, and it is they who can be innovative to make conducive changes in their living environments. It will bring an income to some members of the shanties as well as employ the boys in the area usefully in collecting odds and ends from the city.

Conclusion:

In this brief paper an attempt was made to appreciate the major characteristics of the shanty dwellers' lives and their priorities, and at the same time attempts were made to suggest improvements where possible in the major areas of their life, without disrupting unduely their living environments, behaviour schemes of life and without too much demands on their limited resources.

Figure 1

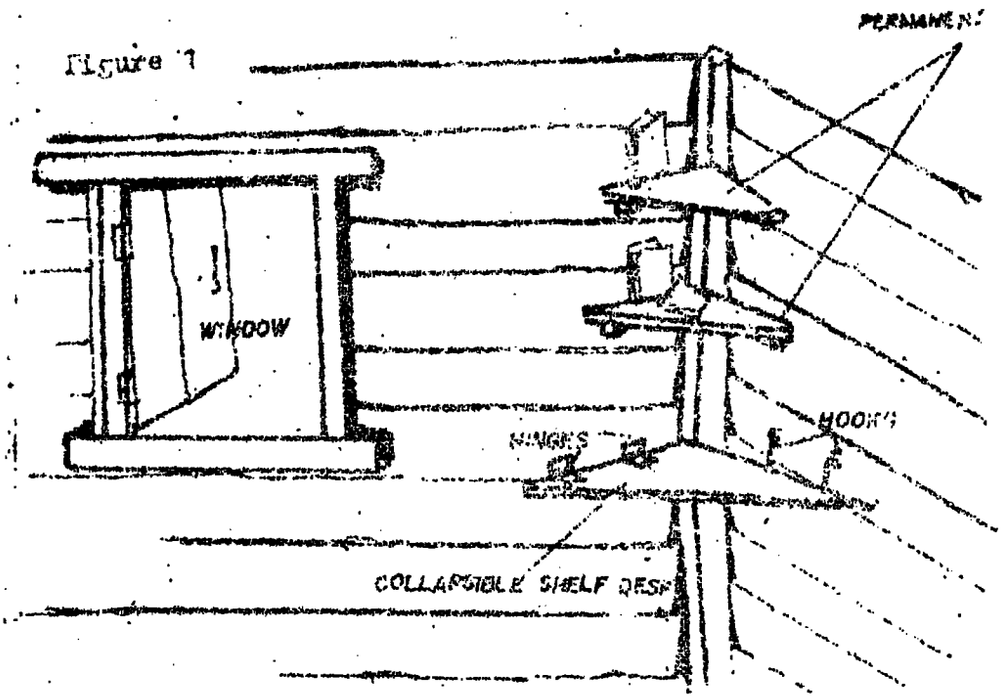


Figure 2

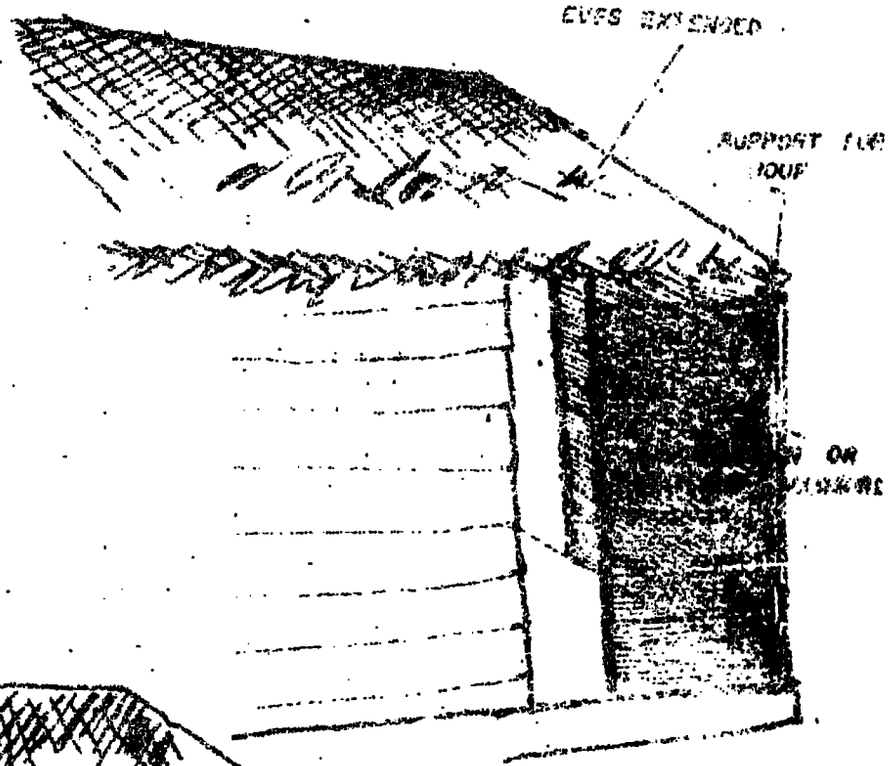
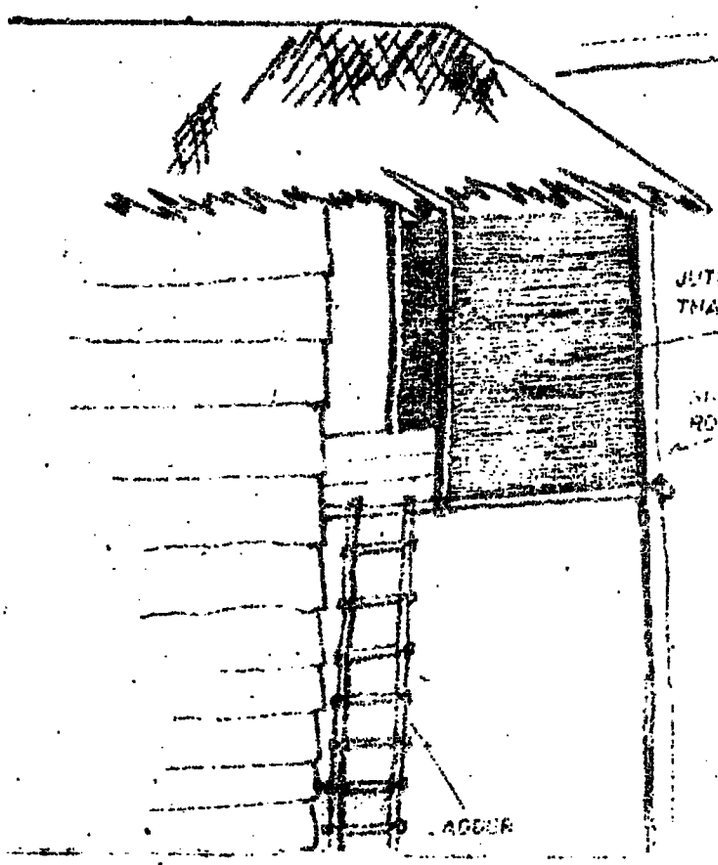
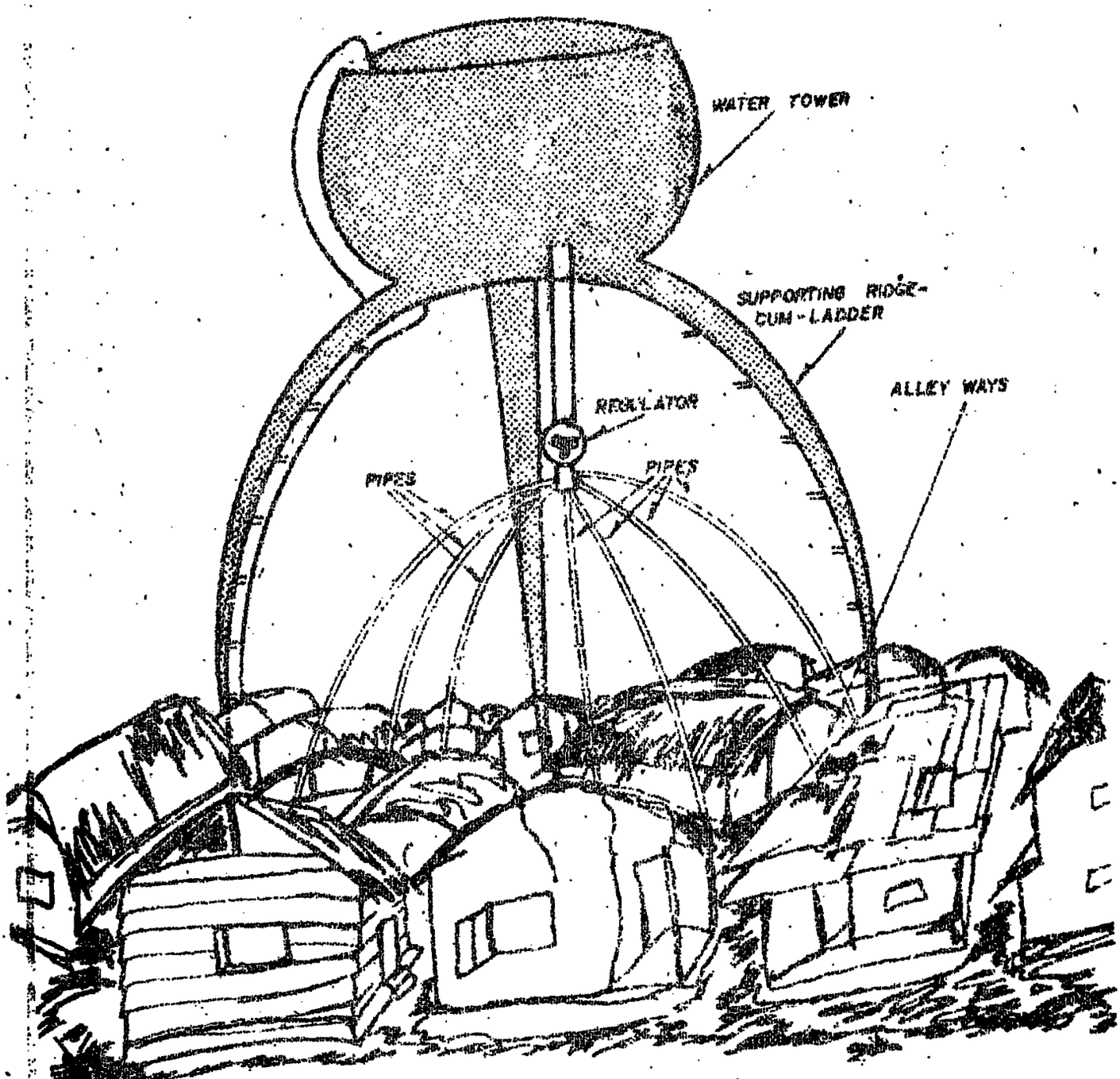


Figure 3



A WATER TOWER OVER THE CONGESTED SHANTIES
WITH FLEXIBLE PIPE-WATER SYSTEM



Picture 4

RESETTLEMENT OF SHANTY DWELLERS

Peter Andre Wyss UN Expert

1. Introduction: If shanty dwellers are by definition illegal occupiers of public or private land and that, for one reason or another this land has to be made use of, then the question of resettlement has to be studied in more detail.

The following paper is not discussing whether the resettlement has to take place or not, nor is it looking into the question whether the resettlement is politically feasible; this paper is based on the assumption that these two basic questions are answered both with "Yes". It is therefore assumed to start with, that it is unavoidable to resettle shanty dwellers and the study shall highlight some major problems which come up, if families have to be moved from their place of residence.

In order to assess the problem, a simple survey was carried out in two steps, mainly questioning the willingness for resettlement and some socio-economic data. This relatively "dry" survey was backed by field visits, by talks with the shanty people and finally by a video tape film, which was recorded in order to bring a lively picture into the office of the people who had to take the last decision on this matter.

2. "Moving out of Colombo?"

As it was to be expected, a vast majority of people did not like to move out of Colombo City, namely 88% and only 12% were willing to do so, provided the necessary assistance was given by the government. The main reason given for remaining in Colombo is to stay as near as possible to the work places and other facilities.

2.1. Employment: Only 1/3rd of the working population has a permanent job, whilst all the others have only temporary and casual jobs. It is also important to note that out of a population of 4521 (814 families; average 5.5 people per family) only 753

employment that is 18%. The unemployment rate is therefore extremely high, say between 30% and 45%, depending on the age and sex characteristics which were not questioned in detail.

2.2. Income: The big share of unemployed and underemployed people in the questioned shanty areas is evidently resulting in very low incomes, where the lowest approx 30% of all families earn 50 to 150 Rs. per month and the next 60% of families earn between 150 and 400 Rs. per month, leaving only about 10% earning more than 400 Rs.

The shanty incomes (Fig. 1) are generally about 50% lower than the overall urban incomes and the assumption that shanty-people live in lower socio-economic conditions, seems to gain more factual ground by this data. However, there are high disparities in the distribution of income, namely a lowest group of shanty-dwellers with incomes below human standards, a middle group which can just make a living and a small 10% group with "good shanty incomes". It would be interesting to know whether the "shanty leader-ship group" is conform with anyone of these income groups.

The average annual income comes to about 2800 Rs., of which 10% for housing would about to 280 Rs. annually (partly spent for maintenance and partly for amortization and interest). The cost per house, including land, services and basic structure should not exceed 5000 Rs. in the average. At this point it should be mentioned that the effects or countereffects of a subsidy could not be predicted without more detailed study of the legal and political aspects. But at last, the question comes up whether the illegal squatterholder should be encouraged to break the law, whilst the legal slumdweller who, according to general opinion, is worse off, is left with his congested and filthy conditions. A general "shanty and slum policy" is definitely needed to advise "what to do with half of Colombo's population living in slums and shanties.

2.3. Expenditure: All of these families spend necessarily the bulk of their income for food (60 to 90%) and very little is left for clothing and shelter. Somehow we were however impressed by the relatively high standard of cleanliness of these shanties and although the economic standards were at the lowest, the people made a living far better than anyone could expect.

Expenditure for Housing: At the present moment, as these shanty-dwellers are illegally occupying public land and most of them are owners of their own shack, expenditure for shelter is reduced to repair and maintenance; in general below 5% of income. This amount would definitely increase with a resettlement scheme and the benefit would be: legalisation of land-ownership and improvement of social and physical conditions. Most of the shanty-dwellers seemed to evaluate these points highly enough to justify the increase in expenditure.

Expenditure for Transport: Questioned to where they would like to move, the big majority (88%) preferred to stay in Colombo, even if it was an unfavourable place (low lying land etc.) because moving out of Colombo would have meant a very substantial part of the income to be spent on transportation.

For example Homagama, the transportation cost of about 30 to 40 Rs. per month would mean more than 40% for the lowest income groups, around 20% for the middle group and around 10% for the highest incomes. It was therefore not possible to expect these income groups to travel to work for such a long distance and it would mean from the point of view of family expenditure, that lowest income groups should live within a few miles of possible work places and that distance to the work place could increase with the capability to pay for transport. This however contradicts with the high land prices in the city. At this point, the reader would probably like to know where the work places in the Colombo Urban area are located in order to find possible sites for Shanty resettlement.

2.4. Where are the work places? A rough survey of the Metropolitan area shows (see graph) that the majority of all work places are to be found in Colombo City where at least two and a half times more jobs are available than can be occupied by City dwellers. This fact results in a very dominant commuterpattern, where about 500,000 people travel into Colombo and the same amount out again day by day. It is assumed that only a part, say 300,000 commuters travel for work which adds together with the 200,000 employed Colombo residents to about 500,000 workplaces.

Unfortunately in the Urban Area (Ja-ela to Panadura) in the average only one out of three employed finds work in his area and the other two form part of the commuters to Colombo who join on their way their colleagues living in the outer metropolitan area (Negombo to Beruwala).

Fig. 2 summarizes in schematic form the relation between work and residence for the Colombo Metropolitan area (Colombo Municipality, inner Metropolitan area IMA (excl. CMC) and outer metropolitan area OMA) based on the 1971 statistics (rounded to 100,000)

	Colombo MC	IMA (excl. CMC)	OMA
Population	600,000	900,000	1,200,000
Employed	200,000	300,000	400,000
Job offer	500,000	100,000	200,000
Commuters	-	200,000	100 - 200,000

The Inner-and Outer-Metropolitan area show a vacuum of 300 to 400,000 working places whilst Colombo City offers about 500,000 jobs (say 200,000 for City dwellers and 300,000 for commuters).

2.5 Land-availability : Our moves to find suitable land as near to work-places as possible lead to a complete deadlock, because there is very little ready-to-build land available in Colombo and land-prices are very high. It was necessary then to look at the low-laying land (mostly marshes) in and

around Colombo, because about 1/3 of the total Municipal Area is still low-land, a very substantial portion of which was proposed to be reclaimed, naturally for a very high price. A perch of marshy land costs about 350 Rs. whilst reclamation adds roughly 2000 Rs. bringing the cost of a very small 2 perch plot to 4700 Rs. A house for a low income family as stated above, should not cost more than 5000 Rs. and this sum in the case of reclaimed land, is already used-up by the land cost. It was therefore necessary to find a cheaper solutions make use of low-land with only partly filling.

2.6 Summary: Shanty-people in the two questioned areas depend largely on temporary and casual employment. Most of the workplaces are concentrated within the city of Colombo and in order to save transport cost, people settle as near to the workplaces as possible. Incomes are low and are spent mostly on food, little on clothing. Hardly anything is left for shelter, transport, medical care or other needs. Housing cost must be kept to a bare minimum but landprices are very high.

The evaluation of this short analysis leads to two basically different alternatives:

A) living as near as possible to existing work-places (resettlement in Colombo)

B) settlement outside the city on cheap land with provision of work-places.

3. Proposed Resettlement Schemes

Before introducing the schemes, it is necessary to remember that the 4500 shanty dwellers under discussion represent only a tiny fraction of the estimated more than 100,000 within Colombo Municipality and that any scheme shall not only be seen as solving the immediate need but also to serve as a learning object for establishing later a comprehensive slum and shanty policy. The scheme could serve practically as pilot projects and three different schemes were studied, taking also the land availability and land costs into consideration.

A. "Living follows workplaces"

Scheme A 1, Resettlement in a lowlying area in Colombo,
Scheme A 2, Resettlement on reclaimed land in Colombo,

B. "Workplace follows living"
Scheme B 1: Resettlement in the Outer Metropolitan area with creation of jobs.

3.1 Cost-benefit: The cost for all three schemes was calculated for purchase of land, building material, sanitary facilities, water-supply, site preparation, refuse-collection points and operating costs. The benefit results from the resale-value of the vaccated land at an estimated value of about 7 million Rs., which would mean that the resettlement cost per family could rise from 5000 to about 8000 Rs. This considerable improvement makes it necessary to look into the question "whether this land can be sold or whether it forms part of the land policy".

3.2.1 - Scheme A 1: Area is lowlying marsh-land in the extent of 20 acres, flooded during a certain period of the year by rainfalls, and the soil is inadequate to bear even the lightest structure.

It is therefore necessary to prepare the site in such a way that it can bear a light structure without reclaiming the marsh-land by complete filling. Piles or pads could serve as a base to support the structure and a public mound would be filled to serve as community and access-space. The design was done under the following objectives:

- every house shall have access to the public mound in order to give everyone a chance to run a shop or workshop.
- the frontage of the plot shall be minimal in order to minimize the road-length (save time and cost)
- the public mound shall form from time to time open squares, where people can meet, children can play, where the public water tap is placed, etc.

- the settlers shall be encouraged to shape their own community-space,
- the plots will be orientated to optimize ventilation and minimize heat load by sunshine,
- the sanitary facilities shall be easily accessible and the collection pipe shall be of minimum length,
- the roof is the main element of the house, protecting from sunshine and rain,
- the initial construction shall be simple and lightweighted to be built easily without machines by the owners,
- the owner shall have the possibility of improving and or expanding the house according to need.

A pilot project of this nature should especially give answers to the following questions:

- does the design help the pepple to feel safe on the marsh-land?,
- how do people organize themselves to care for polution-control of the marshes?,
- would people make use of the partly flooded marsh-land for fishing etc...?
- could plants be grown to reinforce the soft ground etc...?
- would people improve their structures gradually or not ?
- etc...

The evaluation of these answers should feed back to the formulation of future resettlement schemes.

3.2.2. Scheme A 2:

The site is reclaimed land in the extent of 20 acres out of which 7.2 acres are almost immediately available. The land-price (originally very low) after reclamation by filling, has increased to 2250 Rs. per perch and naturally this is the basic reason why the resettlement on either highland or reclaimed lowland becomes very expensive. Sanitation and preparation of site adds only about 10% more to the cost.

As one can see from table Fig. 3.1, the cost per family decreases rather fast with the reduction of the plotsize or to compare it with densities: the increase in density reduces the cost per family, mainly because the major cost component is the landprice, which is independant of the number of settled families and the landcost is simply shared by a greater number of families. (see chart Fig. 3.2). The higher the density, however, the more importance shall be given to the layout design which has to assure optimum living conditions or say, has to avoid the settlement to return fast into a new slum.

3.2.3. Scheme B:

The site is a neglected rubber plantation about 20 miles from Colombo and has access for schooling, health and social services within easy reach. Part of the land would be used for setting up an agricultural or industrial estate to provide an economic base for those settling there.

As shown under 2. above, transportation cost would be excessively high for the majority of the people and it is, therefore, vital for the success of this proposal that the necessary jobs can be provided on the spot or nearby. Otherwise, it would be unavoidable for the people to return one night to Colombo and settle somewhere, somehow,

In that case, the scheme would turn from the cheapest into the most expensive, because there would be nothing left than expenses.

3.3 Comparision of the schemes and conclusion Table 3.1 show the cost comparision of the three schemes. As one can see, Scheme ^{B} is by far the cheapest, however, the cost of setting up an industrial estate, which is a vital factor, has not been included in the settlement cost. Following with 5400 Rs. per family comes scheme $^{A\,1}$ and with 11200 Rs./ Family scheme ^{A2}.

Fig. 3.1 comparative table of three alternatives:

	A1	A2.	B
Number of families	400	300	370
extent of land (acres)	10	7.2	20
density p/acre	225	230	100
plot-size: perches	2.5	2	4
cost of land Rs.	500,000.--	2,595,000.--	140,000.--
sewerage/water Rs.	725,000.--	660,000.--	177,000.--X
site preparation Rs.	270,000.--	40,000.--	30,000.--
piling	570,000.--	---	---
refuse collection points	25,000.--	20,000.--	10,000.--
operating cost	40,000.--	30,000.--	10,000.--
total cost	2,190,000.--	3,360,000.--	331,000.--XX
cost per family	5,400.--	11,200.--	900.--
cost w/increased density	4,750.--	8,500.--	780.--

X-note : no sewerage forseen, only soakpits

XX-note: cost of industrial plant not included

We shall now quickly analize the effect of higher density on the cost per family (see Fig. 3.2) .

A 1) An increase in density from 225 to 310 persons per acre reduces the cost per family from 5400 to 4750 - Rs. or by 12%.

It is doubtful whether the slight decrease in cost is the effort worth, because the environmental condition will suffer substantially.

A 2) An increase from 230to 310 persons per acre reduces the cost from 11,200 to 8,550 Rs. or by about 24%. In this case the cost reduction is more effective than in the previous example. As the scheme is built on firm land, the congestion will be felt less, but, the layout- and house design will decide a lot on the quality of life in such a scheme.

B) Here, the reduction is only 110 Rs. and it is very questionable, whether it is worthwile to increase the density.

4. Conclusion: Each of the three different alternatives (A1, A2, B) has advantages and disadvantages which could be tested in three different pilot-projects.

The main objective would not only be to make the schemes attractive enough to prevent shanty-dwellers from going back to their shanties, but also to get the people to become a consious and active community which cares for their own affairs.

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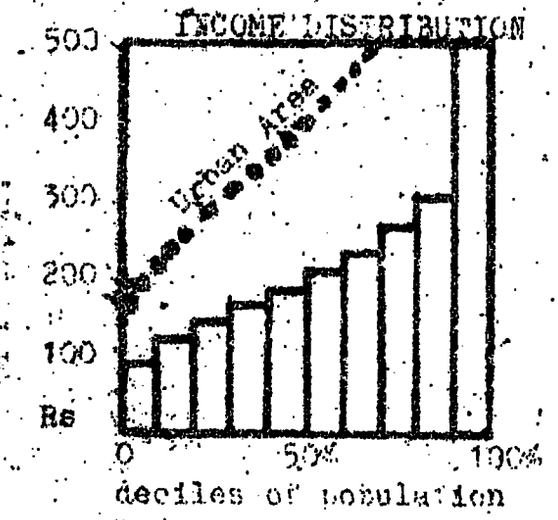


Fig. 1.1: Income distribution for Shantipopulation is much lower than Urban average.

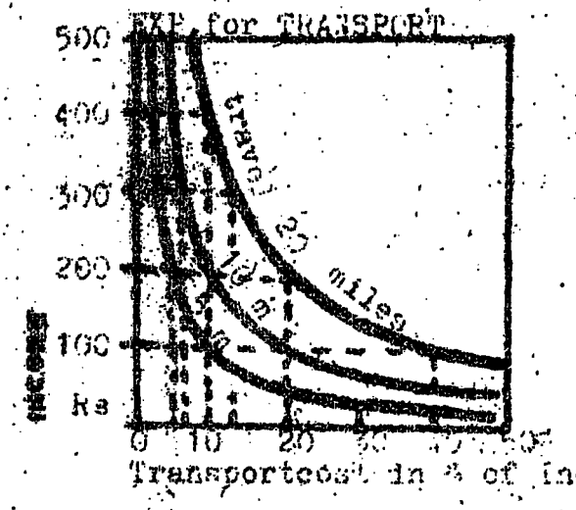
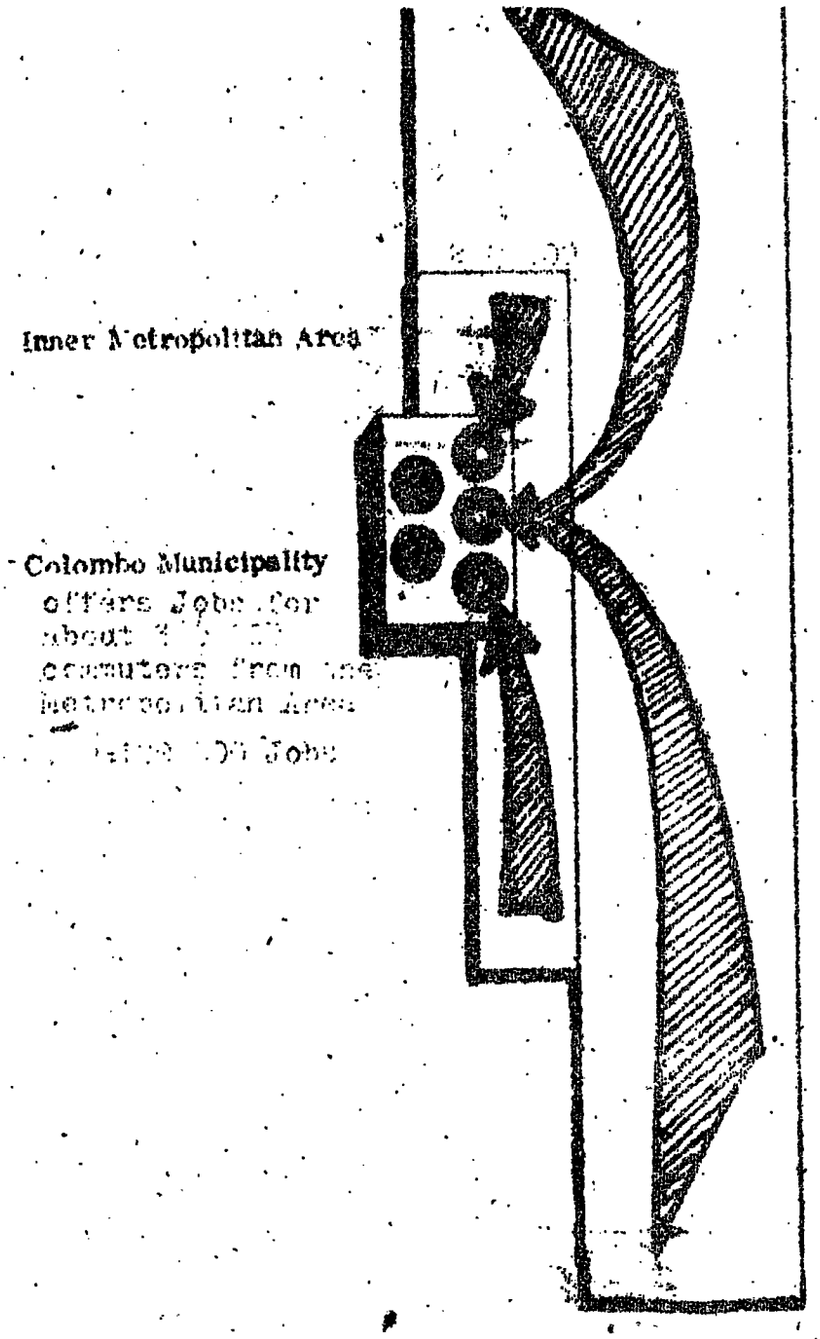


Fig. 1.2: Transportcost in percent of income. The further away one lives, the more he payes for transport.



Illustrates the relation between density and cost and it demonstrates that the two schemes with low landprice (A1 and B) are less sensitive to the changes of density, i.e. moving up or down on the vertical axis (density) has considerably less effect on the horizontal axis (cost). This is quite different in scheme A2 with an original high landprice.

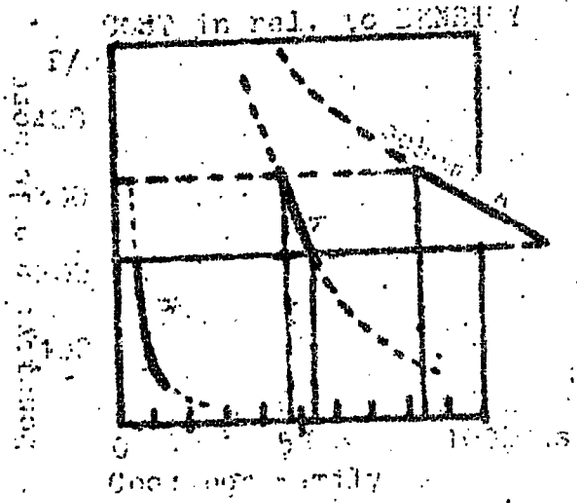


Fig. 2

Colombo City is overcrowded with workplaces, whilst the Suburbs have a vacuum: more than 300,000 travel daily to Colombo.