A Holistic Approach for Providing Affordable Housing to the Urban Poor of Nepal

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Abstract
Housing is basic human need for civilized living but it has become one of the complex problems for the low-income urban dwellers even to afford a modest house in Nepal. This paper thus aims at analyzing housing problems, government policies as well as the prevailing methods adopted and their shortcomings. It investigates existing housing, demographic and socio-economic situation of urban poor and their voices regarding problems and possible solutions through questionnaire survey of Banshi Ghat squatter settlement, selecting it from the 61 such settlements of the Kathmandu city. The findings are analyzed and formulated the concept of a Holistic Approach1 to provide the affordable housing to all income groups with special consideration for low income people. This concept creates the mixed community consisting of employment opportunity of primary, secondary and tertiary activities with active collaboration of 3P’s (People, Public organizations and Private organizations) and supports the vision of the Human Settlement Section of UN ESCAP2. Finally, it compares the Holistic Approach with prevailing method showing its supremacy.

Keywords: Nepal; holistic approach; affordable housing; squatter settlement; urban poor.

1. Introduction
Housing is the fundamental requirement of human beings and important social indicator of any nation. In Nepalese society, housing has a great importance. To construct a house in a life time is taken as essential activity. Yet a substantial proportion of country’s populations are living in substandard dwellings and unhealthy environments. According to Nepal National Housing Survey 3, out of total housing stock of 3 Millions in 1991, 0.3 millions dwelling units are in urban areas. Existing levels of infrastructure provision are, in general poor. One fourth of urban households reside in rental accommodation and 8.61% of households are estimated as living on public lands and buildings called squatter settlements popular as ‘Sukumbashi Basti’ in Nepal. Realizing this fact government has worked out ‘National Shelter Policy’ in the ‘Ninth Plan’4 (1997-2002) with the view of solving the housing problems of the country. The problem is more severe to the low income people. For most of them, a decent house is becoming beyond their reach. It is therefore ‘How to materialize the shelter policy?’ is a great challenge to the Engineers, Architects, Planners and Policy makers. Against this backdrop, this study proposes a solution appropriate for the developing country like Nepal, where government cannot invest much.

2. Study Methodology
This study mainly intends to address three basic questions:
1. What are the initiations and shortcomings of the government housing policies?
2. How is the present urban housing situation and problems of Urban Poor in Nepal?
3. What approach is required to find the solution and how it differs from the prevailing one?
Thus, the method of study involves the review of past reports and relevant literatures; field investigation of different projects like Pokhara Housing Project of Employee Provident Fund, Apartment houses of Tashi Housing Company and Priyanka Housing Apartment; and a questionnaire survey of Banshi Ghat squatter settlement of Kathmandu, the capital city of Nepal. The study findings are analyzed and then formulated the concept of Holistic Approach to provide affordable housing to all.

3. Government Housing Policies and its Shortcoming
The National Shelter Policy 19965 is the first policy concerned about the shelter in Nepal to fulfill the need of dwelling units in the form of a basic need of the entire people. Although many efforts has been done in the past, due to the weak implementation and various shortcomings in the plans & regulations, the city grew
haphazardly according to the individual landowners and brokers rather than the proposed plan. Town Development Act 2045 (1988) was enacted after which the Government had legal basis to intervene in the land development process. Three strategies are proposed for developing land for housing: 1. Site and Services 2. Guided Land Development 3. Land Pooling. But due to the lack of technical, financial, clear policies and legislatives acts, these have not been very successful and taking many years to complete the projects with a lot of conflicts at local level. The present land development programs help to some extent for planned urban development. But, the price of the land increases to 2 or 3 times after its development, which in turn becomes a great problem for the poor as it will be beyond their affordability. For example, Kuleshore Housing Project was initiated to provide the land for the low income people but most of the plots were occupied by the others because the plot was beyond the income capacity of the low income people. According to recent apartment act, soon apartments constructed mostly by the private sectors with the principle motive of profit, are coming in the housing market. The price seems unaffordable to low income people. Therefore, the main objective of planning ‘social equity’ has not been reaching to the poor people. In other hand, the government has the policy of free distribution of land to landless people called as Sukumbasi. But it has not solved the problem; rather making the problem more complicated. The common trend investigated from the survey is that people are shifting one after another place for better job. But unfortunately no where proper address of job opportunities for them compels to become squatters again and again continuing the cycle of squatter settlement. The number of squatters reached to more than five times in Kathmandu within 15years verifies the same.

4. Survey of Banshi Ghat Squatter Settlement of Kathmandu Metropolitan City- The Study Area

The only one metropolitan city of Nepal, Kathmandu Metropolitan City houses about 20% of the whole urban population of the country and covers the area of about 50.8 Sq. Km. The city has been facing a number of housing problems regarding Housing finance, Housing market, Construction technology and Building materials. While in other hand, urbanization and migration has resulted in escalating land prices, building costs and rents in Kathmandu, putting land and housing beyond the reach of the urban poor. As a result of which a number of slums and squatter settlements has been growing in Kathmandu. Lumanti, an NGO working for shelter, have investigated that 2134 population living in 17 squatter settlements in 1985, have reached 11,862 populations and extended to live in 61 such settlements in 2000.

The house price to income ratio is 10.6 for the city of Kathmandu. For affordability analysis, four income groups- Economic Weaker Section Group (EWSG), Low Income Group (LIG), Medium Income Group (MIG) and High Income Group (HIG) are classified (Table1). City Diagnostic Report 2001 analyses a 35m² house in 80 m² plot costs about US $ 13300. Therefore, Table 1 illustrates that even assuming 20% saving by EWSG & LIG and 30% saving by MIG and HIG as payment capacity for housing, the majority of people cannot afford a decent house in Kathmandu with their savings of 15 years, unless a new approach is not devised. In order to develop a new approach, better understanding of demographic, socio-economic and existing housing situation of Urban Poor and their views are extremely important. Realizing this, Banshi Ghat Squatter settlement is selected for the case study among the 61 squatter settlements of Kathmandu City. It is selected due to its location at city center and possessing reasonable population size for the study. The total number of houses and households are counted visiting each house prior to the survey. Then, the survey was conducted in 1999, asking already designed questions to one third of the households randomly and completed in three days performing 9 a.m. to 5 p.m. each day. The findings of the survey conducted are discussed below with its profile shown in Table 2.

4.1 Types of Squatting: 93 households living in 90 houses among them 88 houses belonging to the people (case of land squatting) and two houses belonging to the Temple (case of building squatting as shown in Photo 2) confirmed the two types of squatting.

4.2 Demographic details:

4.2.1 House hold size and Population: The average household size is calculated as 4.83 on the basis of 31 households surveyed (Fig.1) and nearly one third households headed by female are investigated. 

<table>
<thead>
<tr>
<th>Deciles</th>
<th>Lowest</th>
<th>Second</th>
<th>Third</th>
<th>Forth</th>
<th>Fifth</th>
<th>Sixth</th>
<th>Seventh</th>
<th>Eighth</th>
<th>Ninth</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean MHI (1992) in NRs</td>
<td>670</td>
<td>1123</td>
<td>1533</td>
<td>1945</td>
<td>2346</td>
<td>2869</td>
<td>3514</td>
<td>4468</td>
<td>6344</td>
<td>17063</td>
</tr>
<tr>
<td>Mean MHI (2000) in NRs</td>
<td>1240</td>
<td>2078</td>
<td>2837</td>
<td>3600</td>
<td>4342</td>
<td>5310</td>
<td>6504</td>
<td>8270</td>
<td>11742</td>
<td>31582</td>
</tr>
<tr>
<td>Average Mean MHI in NRs</td>
<td>2438</td>
<td>5385</td>
<td>10006</td>
<td>31582</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Mean MHI in US$</td>
<td>35</td>
<td>77</td>
<td>143</td>
<td>451</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Income group Classification</td>
<td>EWSG</td>
<td>LIG</td>
<td>MIG</td>
<td>HIG</td>
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<tr>
<td>20% Saving in 15 years</td>
<td>1260</td>
<td></td>
<td>7722</td>
<td></td>
<td>24354</td>
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<td>30% Saving in 15 years</td>
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</table>
The approximate population of the settlement is estimated as 449. According to the study done by Lumanti 1996, there were 75 households with the population of 392. Comparing with this data shows the increasing rate of population as 4.83% which is more than doubled the national average of 2.2%. This suggests the migration effect for increasing the population of the settlement.

4.2.2 Age structure: 68% of total population below the age 30 demonstrates that majority of the settlement are children and young people. This indicates migration of young generation from the different parts of the country.

4.2.3 Castes: As seen in Table 2, the settlement is small but highly heterogeneous with people of many castes, supports the composition of settlement as a result of migration of the people from different places of the country.

4.3 Economy and Occupation Status: Table 2 shows that more than half have their monthly household income less than US$44. The average per capita income of the settlement was calculated as US $108, which is less than half the per capita income of the nation. Their incomes are unable to afford rent or buy houses obviously are the major causes of growth of squatter settlement. According to one of the squatters to search a rent house for low income groups are also very difficult as the usual answer of house owner is like ‘Wage laborers do not pay rent in time’. Slightly more than one third of total populations are only employed, among which also more than half have been engaging in low skilled, low income and daily wage types works as shown in Fig.2. This indicates that majority of people are low skilled and unemployed.
4.4 Place of Origin: The survey revealed that nearly two third people have migrated from different districts (Sindhuli, Ramechhap, Dolakha, Gorkha, Nuwakot, Kavre, Nawalparasi, Chitwan, Sarlahi, Dhading, Dhankut, Shindupalchowk and Kaski) of Nepal and rest from different places (Jaisideval, Godawari, Balkhu, Bhaktapur, Farping, Thamel, Basantapur) of Kathmandu Valley. These areas, comparatively socially and economically deprived than Kathmandu, are observed as their origins of migration.

4.5 Reasons for leaving the Original Place: More than half have pointed out the reasons for leaving the original place of residence in search of jobs suggests the importance of job opportunities associated with the housing.

4.6 Housing and Basic Infrastructure Facilities: 4.6.1 Basic Infrastructure Services:
4.6.1.1 Water Supply: The two taps insufficiently providing water to the community (an example is seen in Photo 5). Tap water is used for drinking and cooking while for other purposes water from Well is used. The average tap water consumption per day per house hold is approximately calculated 56 liters from the survey. The low consumption of tap water hints about their poor hygienic and health conditions as well. 45% of the total households have prioritized this problem as their second problem after their problem of house (Fig.5).

4.6.1.2 Electricity: As the settlement has no legal status, the electricity supply is temporary and partial, which also installed with the great effort of NGO's as well as the people of the settlement. Main meter was placed in one house and distributed to other houses. Still only 55% households have the connection of electricity.42% households prioritized this problem as fifth problem of the settlement. (Fig.5)

4.6.1.3 Access Road: The settlement is linked with main road of Tripureshore with motorable gravel road. But accesses with in the settlement area are narrow and earthen road in between the row of houses. It is just sufficient for passing through it.

4.6.1.4 Drainage and Sewerage: There are no infrastructures for drainage and sewerage and 32% households have ranked it as their 4th priority problem of the place (Fig.5).

4.6.2 Dwelling Conditions: 4.6.2.1 Land and House: Squatters do not have the legal status on land, so they do not have exact record of land. Most of them have approximately 30-90 m² of land and approximately 20-40 m² plinth area coverage of their house. 71% of total houses structures are of temporary types with mixed use of discarded wooden boxes and plastics (Photo 3). Rest 29% houses are also semi-permanent made with brick walls in cement mortar, roofs of CGI sheets and doors & windows are made of wood. This shows the majority of houses are unsafe and unhealthy. More than half the houses have single roomed with partial separation for sleeping and kitchen, and limited ventilation for the circulation of light and air. Thus, their houses are just the sleeping place, protecting from rain, sun and wind for them.

4.6.2.2 Building Materials: The building materials used for the construction of houses is cheap, reused and temporary types of materials (Table 2). They are not durable for long time and needs repairs regularly. The houses are facing leakage problem from roof in the lack of good roofing. As shown in Fig.3, most of them have mud flooring and has a severe problem of coming up damp from floors.

4.6.2.3 Toilets: 36% of households have prioritized their third problem as toilets (Fig.5). There are 8 shared toilets used by many families (Photo 6). One has been found using own out door toilet. Majority still use the bank of Bagmati River as open toilet. This advantage is investigated as one of the reason for settling the squatter settlement at the bank of the river.

4.7 Problems of the settlement: As the settlement lies along the bank of the Bagmati River, the settlement has great risk of flood. According to the estimation based on the past flood records approximately 59% houses are normally affected by flood as shown in Fig.4. Each year most of them need repairs. Maximum percentage of households ranked respectively in first, second and third, forth and fifth places their problems as houses, water supply, toilets, sewerage & drainage and electricity (Fig.5).
4.8 Housing Finance: The survey result indicates that three forth squatters made their houses with their own income. They have negligible accessibility to loan for constructing houses from the financial institution as they do not have the legal rights over land.

4.9 Residents Opinion: When the residents are asked what kind of housing they need or want, answers are ‘four bed room, one kitchen and one toilet’, ‘close to the working place’, ‘easy to market places’, ‘having sufficient agricultural land’ ‘good neighborhood’ and so on. This obviously shows housing is more than simply shelter. When asked about their priorities for resettlement program, 45% suggests for good housing facilities, 32% suggests for good job opportunity and 10% emphasizes for agriculture land (Table 2). Some hints of solutions of their housing problems are reflected in their answers.

5. Findings of the Study

The housing conditions of urban poor are lacking proper dwelling standards and basic infrastructure facilities. Their living place is highly vulnerable to fire, flood and earthquake. While in other hand, their socio-economic conditions do not allow them to participate in the housing market. Most of them have migrated there for the job opportunities leaving the original place. Thus, economic opportunities and government policies are closely associated with housing along with Land, Building and Infrastructure. A new kind of approach is therefore needed in order to discontinue the cycle of squatter settlements, tackling all the associated factors of housing collectively with the special consideration for the poor as a sustainable solution in providing affordable housing to them.

6. Holistic Approach and its Characteristics

For achieving the goal of affordable houses for all, realizing the need of integration of many aspects associated with housing, Holistic Approach is devised on the basis of above findings of the study. This is unlike in Land Readjustment method of limited beneficiaries by returning developed land to land owners and the chances of displacement of landowner as in Site and Services method, is the mixed approach of both with some appropriate interventions. In this approach, the land and house are sold to all the income groups with special consideration to Low income people as well as land owners. The main characteristics of this approach are as follows:

1. Designation of socio-culturally accepted and economically sustainable settlement, in order to check the out-migration of the people.
2. Adaptation of the low cost energy efficient housing technology as Pokhara Low Cost Housing project for making the housing affordable to entire people.
3. Application of cross-subsidy principle on the selling price of land and building so that Economically Weaker Section Group (EWSG) and Low Income Group (LIG) can take part in the program.
4. Active participation of all beneficiaries in decision making, construction, implementation and maintenance of the Program. This is actually program of ‘Make Our Home Ourselves’ as the interested low income groups can contribute their labors during construction. The labors contributed are converted into the monetary values that will be deducted at the time of purchasing the houses to them.
5. Construction, implementation and operation of the settlement with the partnership of 3Ps (People, Public organizations, and Private organizations). People- as users, Public organizations- as facilitators and Private organizations - as investors.
6. Provision of the soft loan to the house consumers through the facilities of public organizations.
7. Development of incremental type and skeleton types of houses. The fundamental concept behind this is to provide flexibility for the owner so that they can decide to extend whenever they want and complete the houses as they like.

8. Standardization of land and housing to lower the cost and ease for construction. To break the monotonous design and add architectural beauty to the settlement arrangement of different clusters of houses are proposed.

9. Incorporation of Land for agriculture in the proposed land use plan so that primary activity like farming can be done to achieve the cheap and energy efficient food delivery system, balanced ecosystem, job opportunities to the low skilled people and emergency spaces during the natural disasters like fire and earthquakes.

10. The development of higher density housing within a mixed land-use community (with residential, commercial, recreational, office, institutional, and light industrial options in proximity to each other) greatly reduced the automobile dependency. Unlike the conventional approach (Owner Built up type) and Government intervention approach (Site and Services, Land Readjustments Scheme) for shelter development in Nepal, the housing development process in this approach follows as:

7. Application of the Holistic Approach

This approach is applied for the area of 45.05 ha same area as Nayabazar Land Pooling and Readjustment project. This is the recent project conducted by collaborative efforts of Asian Development Bank, Kathmandu Metropolitan City and His Majesty’s Government of Nepal with conventional approach of relatively successful Land development process. The details of land use of proposed Holistic Approach are described below.

Residential Land: The proposed design parameters for housing are shown in the Table 3. so that total land required for residential land =223410 sq. m. which is 49.59% of total land. Other parameters are assumed as follows: Gross population density = 400 persons/ha and average Family size = 5 so that Designed Population = 18020; Total Dwelling Units = 3604 and Gross Dwelling Units Density = 80 dwelling units/ha. Assuming, Cost price of raw land per m² (x) = US$20 then, Development cost of Land per m² = US$(20+5) =US$25 whereas Selling price of skeleton building per m² (Y) is assumed as US $ 48.

The cross subsidy coefficient to EWSG, LIG, MIG and HIG are set as 0.55, 0.75,1 and 1.5 for residential lands and dwelling units. The selling price per m² land and dwelling units for the different income groups is calculated as product of cross-subsidy coefficient and developed cost of land and building respectively are tabulated in Table 4.

Social Land: The social land is for the development of the social infrastructure required for the settlement. The cost of the social infrastructure is supposed to be provided by the government and recover the cost from the tax and revenue collected from the settlement in future. Social land for the settlement assumed (S) = 3% of total land =13515 m².

Agriculture Land: Agriculture land is provided in this settlement for multi-functional purposes like doing farming activities as well as allowing it as the emergency spaces for the people at the time of disaster (e.g. fire & earthquake) as Nepal lies in the earthquake active region. Agriculture land allocated (A) = 12% of the total land=54060 m²

Open space: Provision of open space has made for making playing grounds, parks etc for providing recreational space. Land of open space (O) =3%of total land =13515 m²

Roads: For the circulation roads are provided. Land for Road (R) = 18% of total land = 81090m²

Economic Land: The land under this category is for economic infrastructure development as job centre in the settlement with the investment of private organizations. This type of land helps greatly to reduce the price of housing for EWSG and LIG during the cross-subsidy as it bears the cost of non sellable land like lands for circulation, open space and social activities. The Economic Land (E) = Total Land - (R+S+ A+ O + R) =64910m² which is about 14.41% of total land. The selling price of economic land (e) in US $ is calculated as follows:

For balanced total investment and cost, e x 64910 + 25 x 54060 + 1204.50 x 1442 + 2737.50 x 1081 + 7300 x 3300 x

<table>
<thead>
<tr>
<th>IG</th>
<th>GFA</th>
<th>FFA</th>
<th>TFA</th>
<th>PA</th>
<th>P%</th>
<th>P</th>
<th>NDU</th>
<th>AC</th>
<th>AC %</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWSG</td>
<td>20</td>
<td>10</td>
<td>30</td>
<td>30</td>
<td>40</td>
<td>7210</td>
<td>1442</td>
<td>43260</td>
<td>19.36</td>
</tr>
<tr>
<td>LIG</td>
<td>30</td>
<td>20</td>
<td>50</td>
<td>50</td>
<td>30</td>
<td>5405</td>
<td>1081</td>
<td>54050</td>
<td>24.20</td>
</tr>
<tr>
<td>MIG</td>
<td>60</td>
<td>40</td>
<td>100</td>
<td>100</td>
<td>20</td>
<td>3605</td>
<td>721</td>
<td>72100</td>
<td>32.27</td>
</tr>
<tr>
<td>HIG</td>
<td>100</td>
<td>40</td>
<td>140</td>
<td>150</td>
<td>10</td>
<td>1800</td>
<td>360</td>
<td>54000</td>
<td>24.17</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>110</td>
<td>320</td>
<td>330</td>
<td>100</td>
<td>18020</td>
<td>3604</td>
<td>223410</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3. Proposed Design Parameters10 for land and dwellings
721 + 15705 \times 360 = 450500 \times 25 + (30 \times 1442 + 50 \times 1081 + 100 \times 721 + 140 \times 360) \times 48.

Therefore, \( e = \text{US$74.70} \). That means the cross subsidy ratio of Economic land = 2.9819. The land use pattern of the settlement is shown in the Fig. 6.

8. Results of Holistic Approach

The selling prices of the dwelling units from this approach are within their savings of 15 years mentioned in Table 1 so that all the income groups can afford a modest house within 15 years (Fig. 7). People who are living in the squatter settlement like Banshi Ghat with average monthly household income of US$44, assuming 20% saving can also afford the house with saving of 9 years including land cost and ground floor of 20 m² in first phase and can add 10 m² first floors as second phase within next 3 years. Hence, the dream of owning the house for such urban poor comes to true from this strategy within 12 years.

Table 5 distinguishes Holistic Approach from prevailing approach showing its supremacy.

9. Conclusion

The conclusions of this paper are as follows:

1. The case study of Banshi Ghat Squatter Settlement reveals that people have migrated from different parts of the country for job opportunities and other social facilities. But people’s inability to buy the land and house or rent the house with their income made them to live in the squatter settlements.

2. Squatters living in the squatter settlements of Kathmandu city, have both problems: external environmental as well as dwelling itself. The problems related to external environments are lack of basic infrastructural facilities like water supply and sewerage & drainage and electricity. And their dwellings have serious problems of heath & safety and highly vulnerable to fire, flood and earthquake.

3. Land is not only the solution for housing. It has wider meaning than shelter and closely associated with socio-economic opportunities as well; along with land, house and infrastructure. Housing problem therefore can be solved only if all the aspects of housing associated with it are considered at the same time.

The Holistic Approach proposed here thus integrates many aspects of housing and demonstrates how it differs with the prevailing approach with example showing its supremacy. It shows how the different income groups can be able to afford their houses within 15 years. If this approach of providing housing is implemented as part of 5-Year Housing Construction Programs in different part of the country, housing problems of the country can be solved and Housing Policy 1996 can be materialized.

Acknowledgments

We would like to express our heartfelt thanks to Prof. Dr. Jib Raj Pokharel, Dean of Institute of Engineering, Tribhuvan University for his valuable advice for this study.

Notes

1. Holistic Approach to affordable housing essentially of considering many aspects of housing collectively, rather than few aspects in isolation. The holistic model described here is therefore much wider in scope than prevailing models to solve the housing problems.

2. The vision of the Human Settlement Section of United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) is the creation of people friendly human settlements which are Economic productive, Social just, Political participatory, Ecologically sustainable and Culturally vibrant. (Internet Source: http://www.unepscap.org/huset/index.html)

Table 4. Selling Price of Dwelling Units for Different Income Groups

<table>
<thead>
<tr>
<th>Income groups</th>
<th>1st Phase Selling Price in US$ (1)</th>
<th>2nd Phase Selling Price in US$ (2)</th>
<th>Total Selling Price in US$ (1+2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWSG</td>
<td>0.55x25x30+0.55x48x20=940.50</td>
<td>0.55x10x48=264</td>
<td>1204.50</td>
</tr>
<tr>
<td>LIG</td>
<td>0.75x25x50+0.75x48x30=2017.50</td>
<td>0.75x20x48=720</td>
<td>2737.50</td>
</tr>
<tr>
<td>MIG</td>
<td>1x25x100+1x48x60=5380</td>
<td>1x40x48=1920</td>
<td>7300</td>
</tr>
<tr>
<td>HIG</td>
<td>1.5x25x150+1.5x48x100=12825</td>
<td>1.5x40x48=2880</td>
<td>15705</td>
</tr>
</tbody>
</table>

Fig. 6. Land use of Proposed Settlement

Fig. 7. Selling Price of Dwelling Units and Buying Capacity

Calculated Mean MHI for the year 2000 as assuming inflation rate 8% per annum from Mean MHI (1992). Exchange rate, 1US$=Nepalese Rs.70 (May 2000)

Visit to existing apartments reveal that people of Nepal still do not prefer apartment housing, they want to stay in their own single house. This approach has considered such culture of people.

The technology is found suitable for the country like Nepal based on field visit analysis of Pokhara Low Cost Housing project and according to Shrestha, B.L. (1999), ‘Cost Effective Building Material and Construction Technology for Low Cost Housing in Nepal’, seminar paper presented at Pokhara, Nepal.

The development plan 2020 proposed by the Ministry of Physical Planning and Work emphasized for promoting Urban agriculture in Katmandu Valley for the balanced development between the urban growth and scarce natural resources such as agriculture land balancing the social, economical and environmental values. The survey result of case study revealed that people have emphasized on agriculture land for farming. Agriculture land therefore can provide the job opportunities for them.

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The average urban household size in 1995-96 of 5.2 persons as mentioned in CDR, 2001. The average house hold size in Banshi Ghat squatter settlement found as 4.8. For simplicity taking average the house hold size is assumed as 5 here for calculation and design of the project.

The selling price was calculated on the basis of cost of construction of houses in Pokhara Housing Project.

Based on the following summary of recommended standards of Urban & Environmental Planning in Nepal (Adhikari, 1998) pp.55-56. Layout - Cluster; Plot size - 36to 72Sq.m.; Gross density(compact) - 400 to 600 persons/hectare ; Open space (Moderate) - 3 to 6% of the project area ; Common area (Moderate) - 3 to 6% of the project area ; Circulation (high) - 20 to 30 % of the project area ; Dwelling size (Intimate) - 36 to 50 Sq. m.; Space / person (medium) - 6 to 10 Sq.m. and Open Space Ratio(Low) - 0.2 to 0.3

Agriculture land is allocated as 3m²/person approximately estimated as required emergency space to the residents at time earthquake for temporary shelter.

Considering agriculture land, little less % of land is allocated for circulation than recommended by Adhikari, 1998 in Note 16.

In the case of India; Gupta,1995 in page 389 mentioned cross subsidy ratio of the land for commercial use is 3, so 2.98 in this case is seem reasonable.

Mentioned in the book ‘Housing in Japan’ published by The Building Center of Japan (1998),as policy adopted by Japan in 1957 in order to resolve housing shortage.

References