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Study on Designing a Sustainable Development and Planning Strategies to Backward Villages of low -cost House in South India

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***Abstract*: - The rapid growth of the Indian economy is the envy of every other nation in the world today. The rate of growth is second only to china. The advent of high tech jobs has exploded the omic conditions in mega cities like Chennai, Bangalore, Mumbai, Delhi, and other industrial towns and cities to great heights. Wireless communication, information technology and the industrial revolution has spread across the country but this blossoming economic growth has not spread to the agrarian populations which reside in the rural parts of the country. The social and economic equity between the two sections of the population is widening every day. Even though it would be pretty hard to bridge the gap, at least attempts should be made to improve the living conditions in the rural areas. An innovative approach to rural housing is suggested in this project, which emphasizes on low cost housing with low impact design (LID). Fly ash based bricks ferrocement, precast components of joinery item and structural members. Solar paneled pyramidal roof with solar passive techniques is used.**

Key words: - Sustainable, ecological and social impacts Biophysical, socio-geographic, green design' ferrocement roof, Solar panels, Photovoltaic Electric Cell, solar lantern,

1. INTRODUCTION

1.1 Background

The rapid growth of the Indian economy is the envy of every other nation in the world today. The rate of growth is second only to China. The advent of high tech jobs has exploded the economic conditions in mega cities like Chennai, Bangalore, Mumbai and Delhi, and pushed the other industrial towns and cities to great heights. Wireless communication, information technology and the industrial revolution have spread across the country, but this blossoming economic growth has hot reached the lower strata people who reside in the rural parts of the country. The social and economic equity between the upper strata and lower strata sections of the population is widening every day. Even though it would be hard to bridge the gap, at least an attempt should be made to provide strategies for promoting the lower strata to become sustainable strata by improving their living conditions.

1.2 Status of Rural Community

India is the largest democracy in the world, with about 16% of the world's population. India's population growth remains around 2%. India has one-third the size of America with a total land area of 2,973,190 km^2. The country remains predominantly rural, with just 26% of its people living in cities, according to recent census.

1.3 Statement of the Problem

The existing living status of down trodden in rural areas, is in pitiable condition. About 40% of the people suffer from agony which leads to homeless, landless and income less state due to the socio-economic impact on the down trodden, the unemployment problems, in rural area, strongly influence the rural youths to become dropouts from schools and colleges. This study has been attempted to promote the rural downtrodden to become a Sustainable Community.

1.4 Importance of the Study

Researchers, all over the nation, tried their best to improve the living conditions of rural community. But very few only focused on downtrodden empowerment. This work is unique, because it provides suitable strategies for promoting the rural downtrodden to become a Sustainable community.

1.5 Research Objectives:

1. To assess the existing socio-economic living status of the downtrodden in the study village.
2. To construct a low-cost test house in the study village for sensitizing the rural community about the construction of low cost house.
3. To provide strategies for promoting the downtrodden to become sustainable community.
4. To test the strategies for achieving sustainable community.

2. REVIEW OF LITERATURE

2.1 Sustainable Community Development

The concept of sustainable development is growing in popularity as it is embraced by government, businesses, and communities faced with environmental, social, and economic uncertainties. Although the concept certainly has its critics, such as the assertion by Luke (2005) that sustainable development merely endorses a different king of consumerist development, there is a growing movement to consider the ecological and social impacts of economic initiatives.

As many community groups in Canada are initiating projects to increase the sustainability of their communities, the research group became interested in knowing whether such initiatives are producing long term changes. The study is particularly interested in the application of the "three pillars" definition of sustainable development; that of sustainable development involving the reconciliation of three imperatives. These are the ecological imperatives to live

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within global biophysical carrying capacity and maintain biodiversity, the social imperative to ensure that the basic needs are met worldwide (Dale 2001; Robinson and Tinker 1997). This is a general enough definition to allow for sustainable development to be interpreted differently in specific socio-geographic situations and to remain meaningful in the race of the dominant element of our societies: the element of change.

The concept of a "sustainable community" is difficult to define. They are communities that meet the needs of current and future residents while respecting the environment and quality of life. Although ecological and economic aspects of sustainability have been addressed by several writers – Kunstler (1993), for example, addresses the issues in relation to urban form – the social aspect of a sustainable community has received less attention. It has been said that the social dimension is the weakest "pillar" of sustainable development.

Community level sustainable development takes place at critical level of response between the national and individual levels. The community responses tend to be self-organizing and are based upon response to specific issues of critical concern to their community. However, communities with few economic resources can find it difficult to effectively create change within their neighborhoods.

In previous research the study found that for such action to occur communities needed to have networks of social capital in place that could create the agency for change (Newman and Dale 2005).

Social capital has been defined in several ways; Coleman (1990) and Portes (1998) explicitly conceptualized social capital as an asset held by individuals, whereas Putnam has explored the ways in which it operates as a community asset held by all. Putnam (2000) defines social capital as "social networks and the norms of reciprocity and trustworthiness that arise from them." Social capital, in this sense, is the connection that a group can use to achieve its objectives. In this study of Kadushin's (2004) definition of social capital as network diversity is considered.

The ability to turn social capital into action can be viewed as a group's agency. Agency is the ability of a group to respond to challenges. There are several definitions of agency, including "the capacity of persons to transform existing states of affairs" (Harvey 2002), "the capacity to plan and initiate action" (Onyx and Bullen 2000) and the "ability to respond to events outside of one's immediate sphere of influence to produce a desired effect" (Bhaskar 1994). A group's agency will impact its ability to successfully engage with sustainable development issues.

3. METHODOLOGY

3.1 General Methodical Approach

To meet objective of this study the researcher used upon study research qualitative analysis and gross root level assessment. This research is descriptive in nature. These methods are described in following section of the chapter 50 % of the people in study area not in pucca house. This research sim is to promote downtrodden section people create own house in sustainable manner in low cost.

Researcher conduct survey on street wise area wise, social status economic wise and interview questionnaire in the local dialect of Tamil used in rural part. By the verbal contact researcher with questionnaire type of flooring, roof type of construction material. Mostly, they are peasants and Agricultural Laborer. Economic status sex, social and surveyed. They are 50% in Pucca, 25 % in Kutcha and 25% thatched roof.

Local Panchayat Councilor, women self-helpgroup, farmer association and Ayacuit Darar sangam were interviewed. Apart from Pasumai Veedu (GreenHouse), Amma Veedu State& Central Sponsored house. This type of houses different opinion in low cost. They create own house by their own cost.

Sogandi Panchayat Village consists of Adivilagam, KanKeyam Kuppam and Sogandi.

- Community population wise calculated
- Basic Village Information
- Household Report of that Area
- Economic Profile of the Sogandi Panchayat

Parameter	Total	Male	Female	Percentage
Population	1504	743.00	763.00	100.00
Population (0-6)	1066	523.00	543.00	70.87
Scheduled Castes	404	210.00	194.00	26.86
Scheduled Tribes	34	18.00	16.00	2.26
Literates	1004	404.00	308.00	66.75
Illiterates	500	172.00	289.00	33.25
Workers	250	355.00	147.00	16.75
Main Workers	101	342.00	55.00	6.71
Main Cultivators	300	106.00	8.00	20.00
Main Agricultural Labourers	200	138.00	25.00	13.30
Main Workers in household Industries	2	2.00	0.00	0.13
Main Other Workers	118	96.00	22.00	7.85
Marginal Workers	105	13.00	92.00	6.98
Marginal Cultivators	102	1.00	0.00	6.78
Marginal Agricultural Labourers	105	11.00	92.00	6.98
Marginal Workers in household Industries	20	0.00	0.00	1.32
Marginal Other Workers	1	0.00	0.95	0.00
Non-Workers	200	221.00	450.00	13.30
Households	350			

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Adivilagam Village

Parameter	Total	Male	Female	Percentage
Population	560	270	290	100
Population (0-6)	160	220	240	28.57
Scheduled Castes	400	190	210	71.43
Scheduled Tribes	0	0	0	0.00
Literates	360	200	160	64.29
Illiterates	200	80	120	35.71
Main Cultivators	200	100	100	35.71
Main Workers in household Industries	60	40	20	10.71
Main Other Workers	20	10	10	3.57
Marginal Agricultural Labourers	200	120	80	35.71
Marginal Workers in household Industries	20	12	8	3.57
Marginal Other Workers	10	6	4	1.79
Non-Workers	50	20	30	8.93
Households	142			

KanKeyam Kuppam Village

Parameter	Total	Male	Female	Percentage
Population	176	84	92	100
Population (0-6)	176	84	92	100.00
Scheduled Castes	0	0	0	0.00
Scheduled Tribes	0	0	0	0.00
Literates	100	55	45	56.82
Illiterates	76	36	40	43.18
Main Cultivators	60	100	100	34.09
Main Workers in household Industries	10	40	20	5.68
Main Other Workers	6	10	10	3.41
Marginal Agricultural Labourers	50	120	80	28.41
Marginal Workers in household Industries	10	12	8	5.68
Marginal Other Workers	10	6	4	5.68
Non-Workers	30	20	30	17.05
Households	44			

4. PROFILE OF SOGANDY PANCHAYAT VILLAGES (SPV)

4.1Case study Overview

The community members of the Sogandy Panchayat (SP) Villages had trouble in meeting the basic daily needs because of reduced livelihood activities of agriculture, the primary source of their survival. Many of the community members are agricultural labours and they don't have land to do farming and permanent home to live. However, there are many other issues the community still faces, such as lack of employment, lack of infrastructure, lack of education, lack of health care services and limited access to outside information. When asked about their current situation, one interviewee said, "They are just postponing their days."

a. Site Description

As rural India is extremely poor, it is necessary to provide houses with a few necessities which are essential for a decent, productive life: a stable house; safe drinking water and sanitation. Sogandi Village of Thirukalukundram Block & Taluk of Kanchipuram (DT), 10 km east of Chengalpat town.

Figure 1: shows the location of Sogandi panjayat villages

b. Reconnaissance survey

The background was gathered about the Sogandi Panchayat Villages in the study area by Sustainable Community development.

c. Reconnaissance survey

A short-term reconnaissance survey wasconducted for a period of one year from October 2013 to
October 2014. The following data were collected.

1. Population
2. Population (0-6)
3. Scheduled Caste
4. Scheduled Tribes
5. Literates
6. Illiterates
7. Workers-
8. Non –Workers
9. Main Agricultural Labourers
10. Households

The table 1 show the gender-wise break-up of population, population of scheduled caste/ scheduled tribes , literates, illiterates etc.,

Table No -1: Gender-wise break up of population, population of scheduled caste, etc., (Sogandi-RURAL)

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4.3.1 Primary status of the study villages

The primary status of the study villages taken survey for during 2016 – 2017. The village population category wise studied.

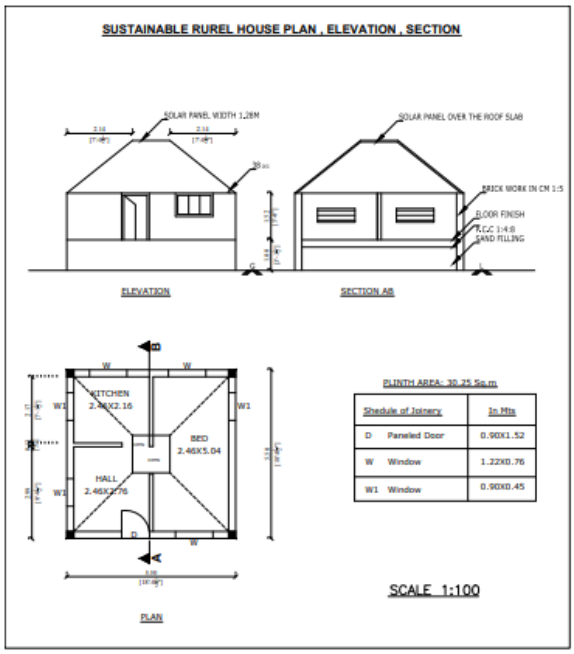
5. DESIGN AND CONSTRUCTION OF SUSTAINABLE OF RURAL (SR) HOUSE

5.1 SUSTAINABLE HOUSE CONSTRUCTION

Shelter is a basic human need. Building and habitats are designed and constructed to fulfill the needs of the community. The basic principles of sustainable design or 'green design', as it is popularly known, are to are to aim for maximum resource conservation, to enhance efficient utilization of non-renewable resources by adopting efficient systems, and to maximize the use of renewable forms of energy as well as to recycle and reuse the resources. These principles need to be applied throughout the building life-cycle e.g. during the site planning and development stage, building planning and construction and building operation and maintenance.

5.2 DESIGN OF SUSTAINABLE RURAL HOUSE

The Solar paneled pyramidal shaped ferrocement roof SPR house is a low-cost sustainable greenhouse constructed by using ferrocement roofing components and 60% economy could be achieved in the cost of the SPR house construction. Figure 5.1 shows the plan and elevation of the constructed SPR model test house in the Sogandi village. The total land area for the proposed house construction including frontage, side and rear side opening for ventilation is 58 sq. m. The plinth area of the house is 30.25sq. m. (5.5 m x 5.5m). Six windows are fitted to have good ventilation inside the house with a size of 0.9 m x 0.9 m.



As this house has pyramidal shaped roofing, the height of the wall is designed up to 1.52m and the height of the pyramidal portion of the roof is 1.52 m with an inclination angle of 38'. The topmost portion of the pyramidal roof has a 1.22 m x 1.22 m flat portion to accommodate the solar panel.

The soil available, in this village, is sandy clay soil. Hence, the depth of foundation is designed for 0.9m, and the size of the foundation is 0.75m x 0.75m. This house is designed by adopting limit state method.

The design results for this house are as follows:

Colum Design

Column size = 0.23 m by 0.23 m square column
Number of columns = 4 nos.
Reinforcement in the column
Main rods = 8 mm weld mesh
Tie rods = 2 layers of 6 mm dia with 280mm spacing
Concrete Mix = 1:2:4(M15)

Roof Design

Roof thickness = 37.5mm
Reinforcement in the roof
Main rods = 8mm with a spacing of 300mm
Distribution rods = 6mm with a spacing of 300mm
Concrete Mix = 1:2:4 (M15)

5.2.1 Features of SR House Construction

The principal material for this house is ferrocement. Ferrocement is selected because it is recommended by AC 1549R-97 as a very good option for making small size houses. Furthermore, all the constituent materials are easily available in India.

5.3 CONSTRUCTION OF SUSTAINABLE OF RURAL HOUSE

One of the primary requirements of a green building is that it should have optimum energy performance and provide the desirable thermal and visual comfort. Three systems are adopted to achieve green building concept in this house and they are described in the following sections.

5.3.1 Solar Passive Techniques in a House Construction

The solar paneled pyramidal roof house is constructed in hot climate and it is oriented in the east to west direction with large size windows to have less radiation inside the house. Three windows of size 0.9m x 0.6m and one window of size 1.2m x 0.6m are provided. Apart from these, two ventilators are provided in the house to allow the natural ventilation inside the house. The roof of the house is constructed in pyramidal shape to have minimum sunlight effect on the building. The total roof area of the pyramidal portion is 16. 4sq.m with an angle of 38' inclination with the horizontal.

5.3.2 Use of Low Energy Materials and Methods of Construction

An architect should also aim at efficient structural design, reduction in the use of high energy building materials such as glass, steel, etc. and reduction the transportation energy. Use of environmentally sensitive construction materials and techniques reduces the embodied energy content of buildings. Some common products are – use of flyash in building materials e.g. use of blended cement for structural systems, use of flyash based bricks and blocks, use of ferrocement and precast components for columns, beams, slabs, staircases, lofts, balconies roofs, etc and use of wood substitutes for doors/ windows / cabinet frames and shutters.

In this house, fly ash bricks are used in the construction of the outer walls of 0.23 m thickness and

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partition walls of 0.125 m thickness. The compressive strength of the bricks, used for the construction of wall, is 81 N/mm^2. In order to have cooling effect, the house is plastered with lime mortar and white washing is also done only with lime powder. The pyramidal roof is constructed with ferrocement of 75 mm thickness. Figures 5.2 and 5.6 show the construction stages of pyramidal roof during construction. Flooring is done with cement mortar of 1:5, waste brick coarse aggregates of 20 mm and thickness of flooring 100mm with 25mm floor finishing. In order to have reduced heart effect, the floor is finished with red oxide mix. The details of materials used and cost of construction of the pyramidal sustainable home are given in Table.

5.3.3 Provision for Energy-efficient lighting

With the application of solar architectural concepts to a design, the load on conventional systems (lighting) is greatly reduced. Further, the energy conservation is possible by efficient design of the artificial lighting using energy efficient equipment, controls and operation strategies. In this model house, one light and one fan are provided. The light and fan take energy from the solar photo electric cell and the same is connected to a solar panel. The cost of providing the solar system in the house is the house is given in Table 5.1. The details of solar energy system provided in the house are given below:

- Solar panels size: 0.6 m x 0.6 m with two numbers
- Photovoltaic Electric Cell: Power capacity – 11V – 18W (Sriram Battery)
- Functioning Hours – Night time only but maximum of 18 hrs. If the sun rise, the light automatically switches off.
- Advantages: Electricity and money are saved. Solar energy is tapped and there is no extra expenditure and no risk of current shock occurrence.
- Apart from this, a solar lantern is installed to standby for the solar panel
- A solar cooker is also available for cooking

Table 5.1 Material Used Costing for SUSTAINABLE OF RURAL HOUSE

Material	Quantity Required	Rate per material in Rs.	Total Amount in Rs.
Fly ash bricks	2700 nos	2.5	6750
Cement	30 Bags	210	6300
Steel	8mm & 6mm	34	5100
Sand	5 units	800	4000
B.G Metal & Metal Chips	LS		4500
Window with country wood	0.9 x 0.6 size - 3 nos 1.2 x 0.6 size - 1	750	3000
Ventilators using Brick masonry	0.9 x 0.45 – 2nos	It is only Labour cost	500
Door with country wood	1 No (0.9 m x 1.5 m)	2000	2000
Labour Charges	LS	_	5900
White washing with lime mortar			500
Solar panel with photo electric cell			20,000
Solar lantern			4,500
Solar Cooker			2,500
Total Cost of the Building			65,550

Household characteristics

The standard NBO questionnaire has been used for conducting the household survey in the study villages in Kanchipuram district. The household survey consists of households detailed information. In addition to the size of the rooms, size of the windows and doors and location of the house in the street are also gathered. The household survey, using the NBO questionnaire, has been analyzed. The following parameters were taken for the analysis:

1. Structure of house
2. Roof type
3. Flooring type
4. House lighting
5. Fuel cooking

In study 60% housing is pucca floor, roof and structure in 20% housing kutcha and 20% houses are thatched roof mud flooring using cooking for wood.

5.3.4 Conclusion

In total cost of the building Rs.65,550 of 30.25sq.m in plinth area are constructed in low cost. But in actual in practice minimum(Rs5600 per sq.m).hence our cost is cheaper (5600-2166=Rs.3434 per sq.m

REFERENCE

[1] Sustainable development by Luke (2005).
[2] These are the ecological imperatives to live within global biophysical carrying capacity and maintain biodiversity, the social imperative to ensure that the basic needs are met worldwide (Dale 2001; Robinson and Tinker 1997).
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