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Case study and design for Pale Bk as green village

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Abstract - Green village is a process that can keep a village attaining sustainable development. It is also the habitat on which human being can live with pleasant environment. Effective and efficient planning of green village is main consideration for its maximum benefits. Aim of designing and planning is based on its energy conservation, efficient transportation, biodiversity, waste management, watershed management, rain water harvesting structure, on conventional resources etc.

In present project work an attempt has been made to reveal feasibility of use of Green village. Under this project work detailed studies will be conducted for analyzing the problem of rural areas. The concept of green village seems to be the best solution for many problems of rural areas.

1. INTRODUCTION

A green village is which can be designed by proper management with the use of non-conventional resources including every square kilometer of the rural area turning into urban pockets providing basic facilities/amenities like power, clean water to drink, solid waste management, public sanitation pods, educational centers, good roads, health centers and communication facilities. India is a vast country spreading over an area of 3.287 million square kilometer, having 7.516 thousand kilometer of coastline. According to the 2011 Indian census, 65.07% of Indians live in different villages according ton 2020. The size of these villages varies considerably the population in 82151 villages is a population less than 500, while 115080 villages have a population of more than 10,000 according to census 2011. Villages constitute a greater portion of India's total geographical area. It is certainly not an overstatement that a major portion of the country's total population resides in the villages. The villages of India can broadly be divided according to the regions of their location like Eastern region, Northern region, Southern region, Central region, Northeast region and Western region. The large variation in climatic condition soil types, water bodies, vegetation types encountered in the countries assets with an endless variety of life between the snow-bound mountains of great Himalayas and the dark. tropical forests. The cultural unity of the Indian people springs largely from the Agricultural character of the country. Even today, when industrialization is progressing and large scale migration taking place from rural areas to cities. and towns, majority of the Indian people lives in villages and is dependent on land. Since time immemorial, agriculture has been a kind of religion in the country. Villages in India often recognized a headman and listened with respect to the decisions of the panchayat. In present-day India, the government supports an elected panchayat and headman system, which is distinct from the traditional council and headman. Indian Villagers share use of common village facilities like the village pond, grazing grounds, temples and shrines, cremation grounds, schools, sitting spaces under large shade trees, wells, and wastelands.

2. Population Forecasting:

For population Forecasting we are using Incremental Increase Method

Year	Population	Increase in population	Incremental Increase
1971	328		
1981	497	169	
1991	781	284	115
2001	1278	497	213
2011	2211	933	436
2021	3222	1011	78
		Total=2894	=842

Average increase per decade, d = 2894/5 = 579

T = 842/4 = 210.5

Population in the year 2051 will be

P2051 = P + nd + n (n+1)/2 x t

P2051 = 3222 + (3 579) + 3(3 + 1)/2 x 210.5

= 3222 + 1737 + 1283

= 6242

Population at the year of 2051 will be 6242.

3. Solar street lights

In layout, total road length is 2000 m. Assume, c/c distance between two street lights=40m

Therefore, No. of street lights required in layout=50

Assume, Street lights are provided with 250 watt mercury bulbs.

Approximate cost for one solar street light for 250watt=33,000 Rs.

Total street light =50 nos.

Total cost=50x33000 = Rs 1650000.

Depreciation cost 10% = Rs 165000.

Repair cost 2.5%= Rs 41250

Interest on investment6%- Rs 99000

Total cost = Rs 1955250.

by electricity for 0.25kw 12 units per day will be consumed per street light

cost per unit- Rs 3.5 .

per year cost for one street light. = (0.25x12x365)x3.5 = Rs 3832

for 50 street light=50x3832 = Rs 191150/-for per year

3.1 Savings and recovery from Solar street lights

1955250/191150 = 10.22 years approximately 10 years 6 months

Therefore, the total cost of street lights will be recovered after 126 months.

4. Solar Water Heater system

After doing market survey the average cost of system is

(Inclusive of installations and fittings) = Rs 41800 Effective investment =Rs.41800.

5. BIO-GAS

Biogas is a clean and efficient fuel. Biogas is produced from Cattle Dung, Human Excreta and other organic matter in Biogas plant through a process called 'Digestion'. Biogas contains 55% to 60% methane which is inflammable. It also contains 30% to 35% carbon dioxide and traces of Nitrogen, Hydrogen and Water. Bio slurry which is bye product has manorial value than farm yard manure.

1	KVIC Floating Drum Types Biogas plants having digester made of bricks or stones	1 to 10 cubic metre
2	KVIC Type Biogas Plants with Fero cement digester	1 to 10 cubic metre
3	KVIC Type Biogas Plnts with Fibre Glass Reinforced Plastic (FRP) Gas holder.	1 to 10 cubic metre
4	Deenbandhu Model Brick masonry b) In Ferrocement with in-situ technique	1 to 6 cubic metre
5	Pre- fabricated RCC fixed dome model	2 & 3 cubic metre
6	Flexi model Bag digester type plant made of rubberised nylon fabric manufactured by Swastik Rubber Products Ltd. ,Pune	1 to 6 cubic metre

5.1 Approved designs of family type biogas plants

Size of plant	**Quantity of cattle dung required daily**	**No. of cattle heads required**	**Estimated cost**
1 cubic metres	25 kg	2-3	Rs.7,000/-
2 cubic metres	50kg	4-6	Rs.9,000/-
3 cubic metres	75kg	7-9	Rs.10,500/-
4 cubic metres	100kg	10-12	Rs.12,500/-
6 cubic metres	150kg	14-16	Rs.15,000/-

6.1 Water Treatment Plant

DESCRIPTION OF TREATMENT MEASURES

SCREENING

The majority of large and visible items found in raw water from surface sources, such as trees, branches, twigs, flora, fish, and animal life, may be eliminated through screening. A centrifugal pump transports the water from the sump to the next unit and is resistant to clogging. The functioning of the pump is controlled by a pump house at the top.

AERATION

The practice of putting water and air into close contact in order to remove dissolved gases like CO2 and oxidize dissolved metals like iron is known as aeration. It may also be used to filter water for volatile organic compounds. At the treatment facility, aeration is frequently the first important step. Constituents are eliminated or changed during aeration before they may obstruct treatment procedures. Aerators are divided into two categories. They either put air in the water or put water in the air. The water-to-air technique is used to create little water drops that fall through the air. Small air bubbles are incorporated into the water stream using the air-to-water process..

MIXING

A flash mixer aggressively mixes and agitates the chemical introduced to the raw water to ensure fast dispersion, and the water is then transported to a flocculation tank equipped with slow mixers. It is made up of a rectangular tank and an impeller attached to an impeller shaft. An electric motor drives the impeller, which spins at a high speed of 100-120 rpm within the tank. A 0.5- 2 minute detention period is also included. The coagulant is delivered through the coagulate pipe and dumped directly beneath the revolving fan. A defecting wall deflects the raw water toward the moving impeller, which is brought independently from the input end. The water that has been fully blended is drained.

CLARIFLOCCULATION

Both dissolved and suspended particles are present in all waterways, particularly surface waters. The suspended particles component of the clariflocculator coagulation is separated from the water by flocculation and sedimentation.

FILTRATION

Filtration is a process for separating particles from fluids by passing the fluid through a media that traps the solids in the fluid. It is determined by the pore size and thickness of the medium, as well as the filtering process. Other methods in filtering include direct interception, diffusion, and centrifugal action, where particles that are unable to follow the tortuous channels of the filter stick to the medium's structure and are retained. A fast sand filter is the most popular form of filter. Water flows vertically through the sand medium, which frequently contains an activated carbon or anthracite coal layer above it.Filtration is the separation of particles from fluids by passing the fluid through a medium that retains the solids. The filtering procedure, as well as the pore size and thickness of the medium, influence it. Direct interception, diffusion, and centrifugal action are further ways of filtering, in which particles that cannot follow the tortuous channels of the filter attach to the medium's structure and are retained. The most common type of filter is a quick sand one. Water travels vertically through the sand medium, which is sometimes topped by an activated carbon or anthracite coal layer.

3. CONCLUSIONS

According to the 2019 Indian census, 65.07% of Indians live in 664,369 villages in different states. Of these, 50% villages have provision for water supply, but very few villages, less than 1% of above have sewage disposal system. Inadequate water supply, no sewage disposal facilities, insufficient health facilities, unemployment and lack of education facilities are some of the major problem in Indian villages. Because of these problem peoples are migrating to city areas which further causes load on public services and increased urbanization.

Detailed study of Pale village was conducted for identification of various problems in the village. The studies reveled that inadequate water supply, no water treatment and sewage disposal, improper solid waste management, need for improving watershed develop etc. are the important issues to be solved.

Planning and designing of various works are carried out for pale village to develop as a green village. Summary of this work is given below.

Planning and designing of water treatment plant for future period=39,24,500/Rs

Cost of solar lights=19,55,250/-Rs

Cost of solar water heating system=41800/-Rs per unit

Cost of solid waste treatment plant=21,57,000/-Rs

Total investment for green village **80,78,550/-Rs** for the development of green village.

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