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Habitat for Humanity to Earth Quake and Tsunami Affected in Andaman and Nicobar Islands - A Study

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Abstract

The nature jostles the Andaman and Nicobar Islands on 26th December 2004 at 6.28 AM when a major earthquake with magnitude of 9.3 shocked the earth having its epicenter of quake at Sumatra (Indonesia) Islands created devastating Tsunami of about 30 feet height overcoming everything that came on its way and cost life and property in the coastal area. Tsunami is a natural disaster that occurs due to unpredictable ruptures in tectonic plates underwater. The severity of Tsunami waves cause damage to life and structures near the shore. Report reveals that 9797 Nos. of houses are damaged, 454 Nos. of human died and 3974 Nos. are missing and 50,000 people were affected by the disaster. The Administration precedence relief and rescue operation in all geographical spread inhabited Islands and to restore back all the damaged infrastructures namely houses, roads, water supply, ports, electricity, transport system and marine fish landing centers.

Coastal communities of fishermen irk the brunt of the disaster, both in terms of the immediate impact of waves and in terms of loss of livelihood. The fisher community depends on fish and fishery products for survival built their house and does fishery commercial activities around the coastal area, but due to Tsunami waves the habitats, fishing crafts and gears located in around the coastal area are damaged or washed out. Fishnet menders, boat repairmen, fuel suppliers and others who provide commercial services to the fishing communities were indirectly affected because their livelihoods were connected to the economic activity of the fishing industry.

The post-Tsunami period in the Andaman and Nicobar Islands has restore affected housing and living conditions of the large number of people whose habitats were destroyed or damaged requires re-settlement and re-habilitation by construction of permanent house was the biggest rehabilitation work to earth quake and Tsunami affected folk.The Fisheries Department provided relief to fishers who lost their fishing crafts and gears, the Administration built houses in hilly area which are far from coast and used construction materials which can resist similar natural disaster in future. The study emphasis on provided habitat for humanity to earthquake and Tsunami affected folks of Andaman and Nicobar Islands.

Key words*: Habitat, Humanity, Earthquake, Tsunami, Re-habitation, Fisher Community*

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

(1). Introduction

Andaman and Nicobar group of Islands is an archipelago of 572 Islands; cover an area of 8249 Sq. Kms, spread over about 780 Kms from North to South in form of a chain of Islands between Cape Negaris (Myanmar) in North and Achin Head in Sumatra (Indonesia) in South. Of these Islands, only 38 are permanently inhabited. The Islands extends from 6° to 14° North latitudes and from 92° to 94° East longitudes. The Andaman Islands are separated from the Nicobar group by Ten Degree Channel. A&N Islands are divided into three districts, namely, the North and Middle Andaman District, South Andaman District and the Nicobar District. The A&N Islands has a population of 3,79,994 (Census 2011) having distance of Port Blair from Chennai, Kolkata and Vishakhapatnam is 1190 Km, 1255 Km and 1200 Km respectively from sea. As per Seismic Zoning Map of India contained in IS 1893-1984 the A&N Islands fall in the Zone V, which is the most severe seismic zone (very high damage risk zone). These are located near the boundary of the Indian plate and the Myanmar micro plate. On the other side, A&N Islands are bestowed with an annual average rainfall of about 3000mm. per year spread from May to November, receive rainfall from both the south west and north east monsoons is highly varied, anomalous and has relative humidity varies from 79% to 89%, wind speed varies from 7km/hr.to10km/hr. The cyclone and rain cloud are formed in sea of the Bay of Bengal and Andaman Sea and moved to other part of mainland India. The immense scale of the tragedy, the reaction to the Tsunami has pursued a model familiar from humanitarian disasters. The first phase was immediate rescue and relief, including clearing debris, cremating bodies, and setting up temporary relief camps for survivors with safe water and food. The second phase is rehabilitation, which will stretch over at least two years, includes the building of permanent homes for those displaced by the Tsunami, along with economic and ecological rehabilitation. The final reconstruction phase that stretch up to 2010 will take a “build back better” approach with an emphasis on sustainable livelihood, improving the productivity and profitability of agriculture and fisheries and strengthening environment.

The Administration priority was to extend relief and rescue operation in all geographical spread inhabited Islands and to restore back all the damaged infrastructures viz., houses, roads, water supply, ports, electricity, transport system and Department of Fisheries provided relief to fishers who lost their fishing crafts and gears. Coastal communities of fishermen irk the brunt of the disaster, both in terms of the immediate impact of waves and in terms of loss of livelihood. The fisher community depends on fish and fishery products for survival built their house and fishery commercial activities around the coastal area, but due to Tsunami waves the habitats around the coastal area are damaged or washed out. Fishnet menders, boat repairmen, fuel suppliers and others who provide commercial services to the fishing communities were indirectly affected because their livelihoods were connected to the economic activity of the fishing industry.

Housing becomes a major issue after earth quake and Tsunami disaster, as affected people loss their houses. It took period of time to create shelter for the people as the Islands supply

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

ports had got damaged due to Tsunami. It has become difficult to make relief reach the affected areas from the mainland country as the Islands mainly rely on mainland. The post-Tsunami period in the Andaman and Nicobar Islands has restore affected housing and living conditions of the large number of people whose habitat were destroyed, washed out due to Tsunami tidal waves requires re-settlement and re-habilitation by construction of permanent house, was the biggest rehabilitation work. The Administration built houses for Tsunami affected in hilly area which are far from coast and used construction materials which can resist similar natural disaster in future. The study emphasis on provided habitat for humanity to earthquake and Tsunami affected folks of Andaman and Nicobar Islands.

(2) Objectives:

1. To study the impact of earthquake and Tsunami on life and property in A&N Islands.
2. To study the relief, rehabilitation works and grant of ex-gratia to affected persons.
3. To study the construction of permanent habitat for earthquake and Tsunami affected folks.
4. To study the re-habilitation and settlement of fishermen affected by earthquake and Tsunami
5. To study the constraints faced by the Administration for construction of the habitat.

(3) Review of Literature:

Vicki Kaskutas,(2013) Residential Fall Protection Case Study: Habitat for Humanity St. Louis Studied the described rescinded the residential guidelines, Habitat International encouraged adherence to the new fall protection standards. Paid carpentry professionals are onsite for every build to instruct, direct, and perform specific tasks; the majority of the homes are built by volunteers have no knowledge of construction, lack skills inherent in the individuals in the trade and are most likely not as agile as seasoned construction professionals.

John Marron (2012) Habitat for Humanity Social Impact Study reveals that the successful placement of one Habitat partner family results in the total benefit is directly attributable to the Habitat model regardless of the household composition of the partner family. In benefits may be realized when a partner family is successfully placed, but the realization of those benefits is contingent at least in composition of those households. It is found with the mission of uniting the community with people in need to provide the life-changing opportunity to purchase and own quality, affordable homes.

Charles Harris (2014) University of Central Florida studies the Effect of Habitat for Humanity Home ownership on Student Attendance and Standardized. The research compares two groups of current and former students of Orange County. Public Schools in Florida children of families who are Habitat for Humanity homeowners and matched socioeconomic control group. The mobility of low-income students who do not have access to stable housing creates numerous challenges both at home and in school. Among these challenges, academic performance certainly is one of the most important. The lack of a more permanent, familiar and safe environment is presumed to impact home life as well as student's performance in the classroom.

Sabyasachi Das (2017) Resilient Housing Design for Tsunami Prone Andaman and Nicobar Islands in India. The thesis addresses the development of a resilient house as a solution for preventing homelessness caused by coastal natural disasters and act as an informative guide for houses that are to be built to make them resilient to similar natural disasters. Resilient housing is a viable solution to reduce the loss of housing post a disaster and to protect human lives through the disaster. The proposed prototype design of the core and shell of the

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

house which is resilient and based on the characteristics of the region is based on studying and analyzing existing research in the field of Tsunami's and their impact.

(4) Methodology:

For the study secondary data collected from Directorate of Disaster Management and Fisheries Department were taken into consideration. The study emphasis on provided habitat for humanity to earthquake and Tsunami affected folks of Andaman and Nicobar Islands.

(A) Earthquake and Tsunami in A&N Islands

i) Damages andDestruction

Loss of Human Lives

Islands	No. of Dead	No. of Missing	Total
South Andaman	7	0	7
Little Andaman	58	16	74
Car Nicobar	270	591	861
Chowra	42	16	58
Teressa	54	6	60
Kamorta	1	295	296
Katchal	1	1553	1554
Trinket	1	82	83
Campbell Bay	20	515	535
Total	454	3074	3528

Source: Directorate of Disaster Management, A&N Administration

Major Physical Damages	
Houses Damaged (No)	9797
Jetties & Wharfs (No)	56
Power Houses Building (No)	28
DG Sets (MW)	37
Roads (KM)	210
Shipping Vessels (No)	9
Fishing Boats (No)	2139
Schools (No)	85
Agricultural Land (Ha)	8069
Health Centers (No)	30
Livestock (No)	1,57,577
Pipe lines (No)	12500
Sea Wall (Mtr)	10790
AnganwadiCentres (No)	94
Coastal Belt Plantation (Ha)	184
Submerged Land (Ha)	1117.87
Damage assessment	Rs.3300 Croress

Source: Directorate of Disaster Management, A&N Administration

(B) Relief and Re-habilitation Package

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

The Empowered Group of Ministers in 2007 has sanctioned a package of Rs.2654.69 crores for relief &rehabilitation works in A&N Islands. Later in the year 2010 the package amount was enhanced to Rs. 2792.99 crores.

The Actual Expenditure for Relief & Rehabilitation work upto 31.03.2011 is Rs. 2858.40 crores. In the 7th Empowered Group of Ministers held under the Chairmanship of Hon'ble Home Minister on 23.12.2011 at New Delhi the Tsunami Rehabilitation Programme(TRP) in A&N Islands is declared as closed from December 2011 with the direction to undertake the balance work of TRP under Normal Plan.

Approved package	Amount
Initial package approved on January, 2007	Rs. 2654.69 Cr.
Revised package approved on 11.02.2010	Rs. 2792.99 Cr.
Expenditure upto 31.03.2011	Rs. 2858.40 Cr.

Source: Directorate of Disaster Management, A&N Administration

Year wise Allotment and Expenditure		
Year wise	**Allotment**	**Expenditure Upto31.03.2011**
Rajiv Gandhi Rehabilitation Package (RGRP)		
2005-06 & 2006-07	454.05	431.14
Additional Central Assistance		
2006-07	375.43	330.24
2007-08	546.60	535.02
2008-09	840.16	837.52
2009-10	642.02	634.32
2010-11	101.68	90.16
Total Upto March.2011	**2959.94**	**2858.40**

Source: Directorate of Disaster Management, A&N Administration

(C) Construction of permanent habitat for earth quake and Tsunami affected

Earth quake and Tsunami affected persons were provided shelter in the relief camps located in 10 Islands of A&N Islands. From the affected areas persons are shifted to safe areas by helicopter. Initially, the affected persons are provided food, shelter and clothes. All basic facilities like road, power, water, community hall, medical and shopping centers provided to the residents to cater to their daily needs. The people who lost their hard earned properties due to Tsunami, the Govt. of India with A&N Administration made all efforts to rehabilitate the affected families by providing permanent shelter in a phased manner. The handing over of constructed houses to affected mark the beginning of the culmination process of the Tsunami rehabilitation programme in A&N Islands. The construction of 9,797 houses is the important component of the Tsunami rehabilitation programme is estimated to cost about Rs.3,140crores. The programme is funded under the Rajiv Gandhi Rehabilitation Package and the Additional Central Assistance. Altogether in 10 Islands, the houses are built for affected persons, The Central Public Works Department has allotted 7,966 permanent shelters, Andaman and Nicobar's Public Works Department 1,122 and non-government organizations 709 houses. While Car Nicobar District accounts for 3,941 houses, Little Andaman has 1,973, Great Nicobar 995 and South Andaman 823.

The environmental issue and site plan accessed keeping in mind possible occurrence of natural disasters. The permanent shelters are constructed in the highly area, as in case of any occurrence of natural disaster it resist and does not get damaged. For the rural areas in

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

respect of construction of houses, landscaping or providing roads and sanitation is a huge challenge and effectively completed by hard work and monitoring. On the other, government found 576 pucca houses got damaged, provided Rs.5760000 @ Rs.10,000/- each, 400 kutcha houses and provided Rs.2400000/- @ Rs.6,000/- in addition to above found 44804 severely an marginally damaged houses provided Rs.8960800/- for repairing the houses of persons, who house damaged due to earth quake. The proposed cost of each house is estimated to be Rs.6.5 lakh in South Andaman to Rs.10 lakh in Car Nicobar and Rs.12.5 lakh in Nancowry Island.

(i) Overall Plan for construction

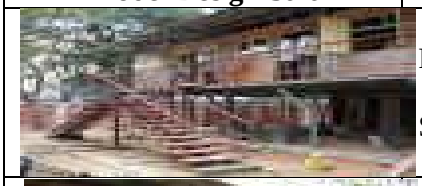
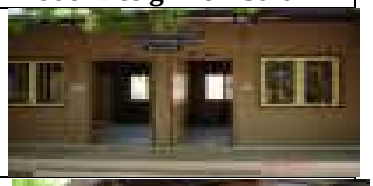
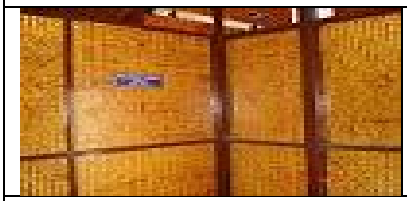
The houses constructed are built on higher plinths, with masonry wall, RC isolated footing and steel structure. Bamboo boards are also used as building material. Sloping roofs are made of tin sheet metal or corrugated galvanized iron sheets. These houses has more open spaces around them that support lateral deformation during earth quake and Tsunami. Construction of 450 sq.ft. of plinth area for each affected family with use of alternative eco-friendly materials in place of timber having supporting infrastructure of International standards.

(ii) Structural measures

A&N Islands falls in seismic zone-v, the report advised that building in these Islands should incorporate features that makes these structure earthquake resistances has features of:

a. Stills made of steel and column should be used for erection of building.
b. Pre- fabricated and modular composite structure.
c. Readily available material like hollow concrete block, steel, iron rods.
d. Roof has rain water harvesting structure.

(iii) Construction of super structure, model, design and specification

Model Design Stilt	**Model DesignSpecification**	**Model DesignNon Stilt**
	Foundation—RCC Super Structure—Steel Frame	
	**Flooring** Stilt -- Processed Bamboo Board Non Stilt-- Cement Concrete	
Wall		
	External—Wooden Planks Internal – Processed Bamboo Board	
Other Details		
Area—450 Sq. Ft. Cost-- The proposed cost of each house is estimated to be Rs.6.5 lakh in South Andaman to Rs10 lakh in Car Nicobar and Rs12.5 lakh in Nancowry	**Site Development works** ➢ Water supply & distribution system ➢ Internal roads & foothpaths ➢ Sanitation & Drainage ➢ Electricity & street lights ➢ Rain water harvesting structure	**Community facilities:** ➢ Markets, schools & PHC's ➢ Community Halls & Birth/Death House

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

Source: Directorate of Disaster Management, A&N Administration

(iv) Super structure fabrication and basic services provided

The government provided all necessary basic services required for the new settlements. Along with housing construction, budget allocation for infrastructure has also been made. CPWD and APWD are also providing services like water supply and sanitation in all the settlements. Centralized water supply schemes and centralized sewerage treatment plants are being planned. The site plan shows the basic community infrastructure like shops, community hall, primary health center, veterinary hospital, park, schools, etc., as per the town planning norms.

(v) Island wise constructed permanent structure

Name of the Island	No. of permanent shelter constructed by			Total
	CPWD	APWD	NGO	
South Andaman	-	217	606	823
Little Andaman	965	908	100	1973
Car Nicobar	3941	-	-	3941
Teressa	506	-	-	506
Katchal	315	-	-	315
Kamorta	518	-	-	518
Nancowry	269	-	-	269
Chowra	346	-	-	346
Little Nicobar	111	-	-	111
Great Nicobar	995	-	-	995
Total	7966	1125	706	9797

Source: Directorate of Disaster Management, A&N Administration

(vi) Permanent structure comparison

Provisions	**Pondicherry**	**A&N Islands**
Living Room	6.73	14.15
Bed Room1	6.48	8.69
Bed Room3	-- --	8.27
Kitchen	4.68	5.46
Bathroom	2.4	3.98
Toilet	-- --	1.75
Open Varandha	2.18	5.4
Plinth Area	29.81	41.82

Source: Directorate of Disaster Management, A&N Administration

The total area of each item is comparatively higher for the A&N Islands. The Plinth area of A&N Islands is the highest. The A&N Islands is providing an additional room compare to the others having separate bathroom and toilet.

(4) Ex-gratia by various natures paid to the Tsunami affected

Sl. No.	Types of Ex-Gratia	No. of Cases disbursed	Actual amount Disbursed
1	Identified Dead, Rs. 1,00,000/-	424	42400000
2	Missing Persons Rs. 1,00,000/-	2694	269249998
3	Serious Injury Rs. 5,000/-	95	475000
4	LG Relief Fund Rs, 2,000/-	18323	36654500
5	House hold articles (max. Rs. 10,000/-)	14967	181795000

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

6	Temporary Relief Rs. 3,000/-	3417	10251000
7	Relief to small business Rs. 10,000		
	(a) Residential area	2926	16876751
	(b) Non-residential area		
8	(a) Loss of paddy/veg./root crop @2000/hect (b) Loss of plantation crops (Coconut/areca-nut) @4000/hect)	11345	117447511
9	Reclamation of land (per hect. Rs. 5000/-		
10	Agriculture / permanently submerged land (per hect. Rs. 10,000/-)		
11	Loss of paddy/vegetables/root crops/ plantation crops (Special package of MHA)	7601	532606127
12	Orphans below 18 years Rs. 2,00,000/-	171	34200000
13	Widows Rs. 1,00,000/-	205	20500000
14	Unmarried Girls Rs.1,00,000/-	36	3600000
15	Fully damaged house (Pucca) Rs. 10,000/-	576	5760000
16	Fully damaged house (Kutcha) Rs. 6,000/-	400	2400000
17	Severely & Marginally damaged houses	44804	89608000
	TOTAL	**10,7984**	**1,363,823,887**

Source: Directorate of Disaster Management, A&N Administration

(5) Re-habilitation and settlement for fishermen

Coastal communities of fishermen irk the brunt of the disaster, both in terms of the immediate impact of waves and in terms of loss of livelihood. The fisher community depends on fish and fishery products for survival built their house and does fishery commercial activities around coastal area, but due to Tsunami waves the habitats around the coastal area are damaged or washed out.

Human settlements are seen along the coastline area of A&N Islands. But these coastal areas are prone to natural disaster like cyclone, earthquake and Tsunami. In 2004, A&N Islands had huge impact on coastal area by earthquake followed by Tsunami caused damaged to life and property particularly person having habitat at coastal areas mostly the fishermen community. In Nicobar group of Islands, some areas are completely washed out. Top priority of Administration was saving the human life, rehabilitation and providing food, cloth and habitat to the affected persons.

The damage cause prolonged economic damage to Fisheries and Agriculture, mostly the fisher community got severally affected by Tsunami as their habitat and fishing crafts and gears got damaged on the other hand fishnet menders, boat repairmen, fuel suppliers and others provides commercial services to the fishing communities were indirectly affected because their livelihoods were connected to the economic activity of the fishing industry. Under Rajiv Gandhi rehabilitation package relief is provided to fishermen for loss of crafts and gears due to Tsunami and provided habitat by the Administration for the fishers who house are washed or damaged due to Tsunami.

The A&N Islands are bestowed with an annual average rainfall of about 3000mm. per year spread from May to November, receive rainfall from both the south west and north east monsoons is highly varied, anomalous and has relative humidity varies from 79% to 89%, wind speed varies from 7km/hr.to10km/hr. The cyclone and rain clouds are formed in sea of the Bay of Bengal and Andaman Sea has impact on life of fisher community. As such, the Department of Fisheries is implementing various schemes such as safety at sea for fisher community and provides assistance for renovation of fisher houses or replacement of roof or thatching of roof**.** Grant Rs 10000/- for renovation of kutcha, semi pucca house and grant

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

Rs 5000/- per house for replacement of roof/sheeting materials with aluminum/asbestos/coal tar sheets are provided to general Fishers and Tribes of these Islands. Moreover, the department is implementing scheme viz. development of modern fishermen village for construction of houses under the scheme 100 Sq. mtrs of land to licensed fishermen and financial assistance of Rs.75,000/- towards construction of house in plinth area of 35 Sq. mtrs provided to fishing community These houses should be of resilience design type house that can withstand disaster is a feasible solution to area prone to natural disaster that can used by the user for prolonged time with enhanced comfort level in context to climate of region and craft design which could be conventional socially for regular habitation. The damaged cause by Tsunami and relief provided to fisher are detailed below:-

Damaged Items	**Damaged**	**Work Completed**
Boats (No)	2065	2065
Fishing Gear (No)	863	863
Pisciculturists (No)	525	448
Fisheries Projects	07	05
Fish Vendors(No)	117	117
Re-commissioning of Ice Plant (No)	03	02
C/o Fish Landing Centres (No)	010	01

Source: Directorate of Disaster Management, A&N Administration

The fishers whose house got damaged or washed out due to Tsunami are provided permanent shelter by the A&N Administration at their respective Islands Tsunami shelter.

(6) Challenges:

1. Scattered Islands over a distance more than 550 Kms.
2. Distance from mainland – 1200 Kms.
3. Limited working season - 4-5 months.
4. Non-availability of infrastructure-Jetties for cargo ships at Chowra, Teressa, Katchal and Nan cowry Islands.
5. Challenges to reach sites/ lack of transportation facilities for staff and labourers.

(7) International Re-Silence Design habitat:

Re-silence design is the international design of building, landscape, communities and region in order to response to natural, manmade disaster and disturbance. The development of resilience house that can be withstand disaster is a feasible solution to area prone to natural disaster that can used by the user for prolonged time with enhanced comfort level in context to climate of region and craft design which could be conventional socially for regular habitation.

(8) Suggestions:

1. Propose for construction of re-silence house design which can be used by users for prolonged time.
2. The house provided to affected person, should not to lease out, sublet or rent the shelters to third parties.
3. Periodical awareness to the occupants of the dwelling units keep the area clean and urged them to develop good relation with their neighbors
4. Propose for periodical renovation of Tsunami shelters.
5. Development of modern fishermen village by Fisheries Department scheme, the construction of habitat should be of re-silences design.

ISSN: 0976-5425
Vol-5-Issue-6-November-December- 2019

(9) Conclusion:

Andaman and Nicobar group of Islands is an archipelago of 572 Islands. Of these Islands, only 38 are permanently inhabitedthe nature jolted the Andaman and Nicobar Islands on 26th December 2004when a major earthquake with magnitude of 9.3 shocked the earth having its epicenter of quake at Sumatra (Indonesia) Islands created devastating Tsunami of about 30 feet height engulfing everything that came on its way, cost lifes and properties in the coastal area.

Fisher community irks the brunt of the disaster, both in terms of immediate impact of waves and loss of livelihood. The fisher community depends on fish and fishery products for survival built their habitat and do fish &fishery related activities around the coastal area, but due to Tsunami waves their habitats, fishing crafts, gears and belongings damaged or washed out. Fishnet menders, boat repairmen, fuel suppliers and others who provide commercial services to the fishing community were affected because their livelihoods were connected to the economic activities of the fishing industry.

The A&N Administration extends rescue and relief to affected persons and provided food, shelter and clothes in all geographical spread inhabited Islands to restore condition. The earth quake and Tsunami affected persons were bequeath with shelter in the relief camps located in 10 Islands of A&N Islands and through Department of Fisheries granted relief towards loss of crafts and gears to fishermen. Hilly area has been selected for construction of permanent shelter. The design and materials used for construction of these habitats are of resilient house, as it can withstand disaster and a feasible solution to area prone which can have used by the user for prolonged time having enhanced comfort level in context to climate of region. These habitats are also provided services like water supply, sanitation, centralized water supply and sewerage treatment plants. For the habitat site, basic community infrastructure like shops, community hall, primary health centre, veterinary hospital, parks and schools makes its users being socially, economically, environmentally responsible and their life are altered with socio-economic development.

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