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A Sustainable Approach towards Development of an Island Community

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Abstract—*The purpose of this research paper is to establish an integrated approach towards sustainable living for the community people residing in a river island which is ecologically sensitive and vulnerable to natural hazards.*
Suvarna river which is an eminent source of sediment disposal along the coastal belts of Karnataka, comprises of fifteen braided islands that had been evolved through ages by avulsion. Timman Kudru is one of the river island located towards the estuarine mouth of Suvarna river with spellbound locale adding to the sensuous beauty to the seascape.
Despite of its natural breathtaking beauty and its tranquil environment that catch holds the eyes of a visitor, it is vulnerable to damaging impacts like climate change, sea level rise, intense tropical storms and river floods. The island comes under CRZ-I which restricts any construction and development within the island as it is eco-sensitive and vulnerable to morphological changes owing to floods and soil erosion. The community of people residing in the island over years are not benefitted with any developmental schemes to improve their livelihood and well-being.
The study aims to comprehensively address the sustainable eco-friendly practices to the threats faced by the island. The paper concludes with a set of guidelines formulated after identifying the issues and analyzing the base situation in the island followed by the regulations of CRZ and proposing a broad developmental proposal for the betterment of living of residing community people
.
Keywords*: CRZ-I, eco-sensitive, river island, sustainable living.*

1. INTRODUCTION

Timman Kudru is the second largest island in size occupying an area of 27 acres in Padu Island, the ninth braided island of Suvarna River. The connectivity to the island is through a suspended hanging bridge which connects the island to the main land with its length is about 90 m and width is 1m. The periphery of the island comprises of scenic views and vistas. (Fig. 1).

The island is a natural habitat for ecosystem and rich in biodiversity. It comprises of 27 families with a sparse population of around 110 people including both males and females.

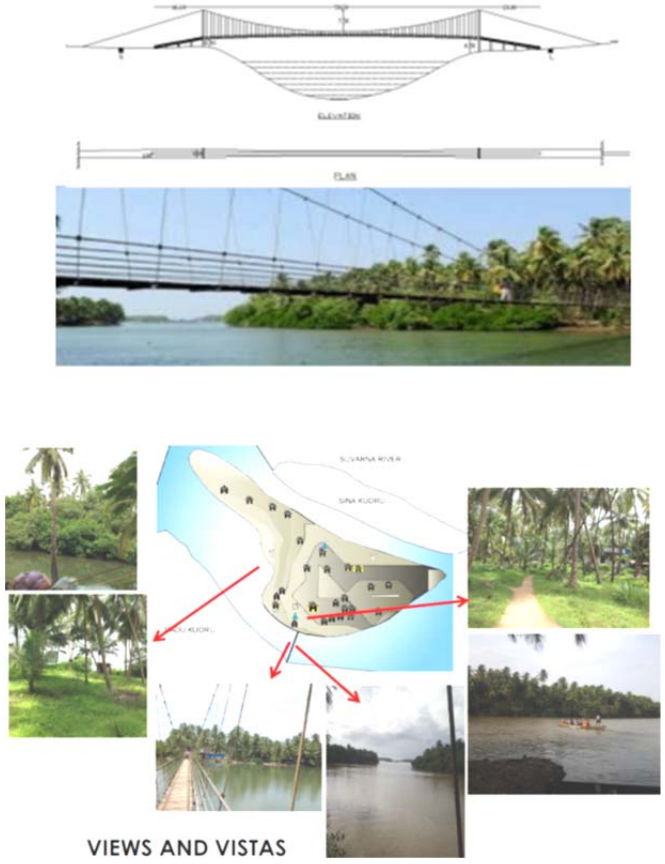


Fig. 1

The morphological history of the island (Fig. 2) shows that the island is propagated by 20-100 m along its entire periphery. The eastern portion of the island is widening and accreting.

The surface elevation from MSL ranges from 8.2 m to 11.3 m towards its northwest and central part. The changes in orientation is basically due to erosion and siltation.

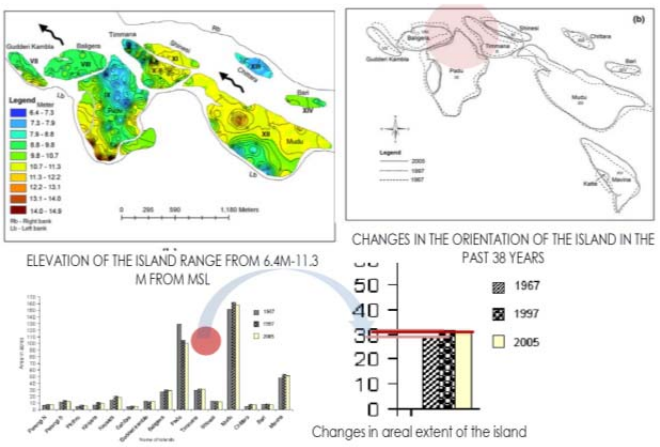


Fig. 2

The island is identified under CRZ-I (Fig. 3), which is defines the island as an eco-sensitive zone, where any development is a threat to the changing landform.

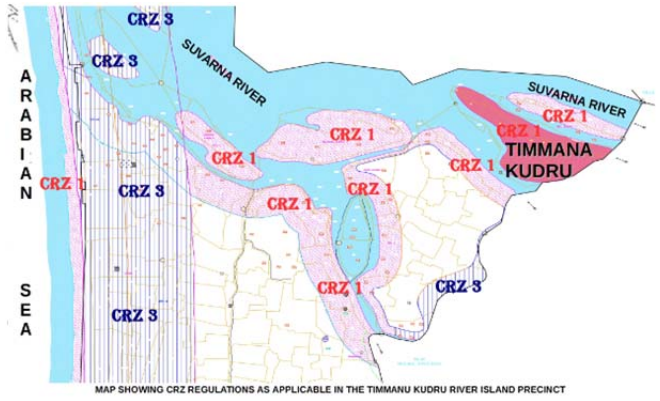


Fig. 3

As per the CRZ notification-2011, the following are the guidelines regulating the development in Timman Kudru:

- No new construction is allowed under CRZ-I, which includes residential homes, permanent structures and other public infrastructure facilities. However, reconstruction without extending the plinth area is permissible is the construction is authorized.
- Renovations and construction of such buildings are allowed subjected to the use of light-weight construction technique and eco-friendly materials that shall cause least harm to the environment.
- Certain activities which have a bearing on rehabilitation are permitted such as agriculture, gardens, play fields, salt generation from sea water and power generation by non-conventional sources of energy.
- Construction of community based facilities such as public rain shelters, provision of facilities of water supply, drainage and sewerage can be provided.

2. METHODOLOGY

A systematic detailed understanding and analysis of the major key issues is essential before any proposal or intervention for any project.

The following chart shown (Fig. 4) is the sequence of methods to be followed before the proposal of strategies to be implemented for the sustainable living of the local community within the island.

The approach to the intervention is breakdown to preliminary study followed by the primary and secondary studies concluded with the analysis and inferences proposing a solution to the issues pertaining to the development in terms of future development proposal.

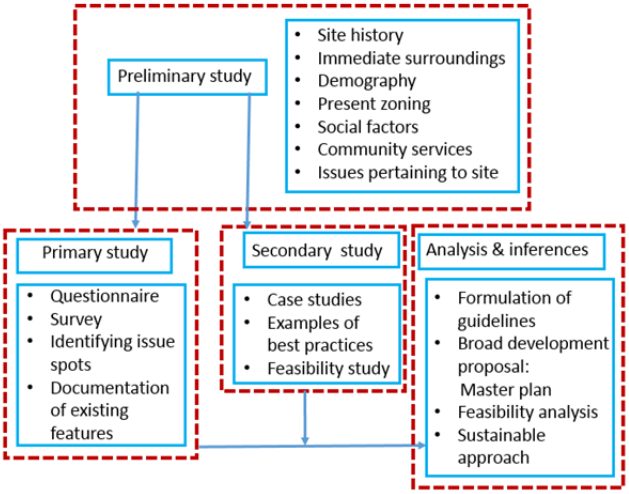


Fig. 4

3. PRELIMINARY STUDY:

The island primary comprises of 27 dwelling units and 2 religious structures. Few structures are under dilapidated conditions which needed to be renovated.(Fig. 5). Island development has involved discovery and settlement leading up to occupancy based on hunting, fishing, agriculture, animal husbandry and, less frequently, on extractive mining activities and trade.

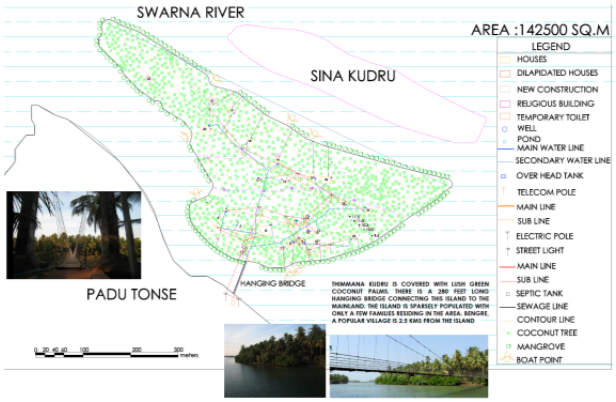
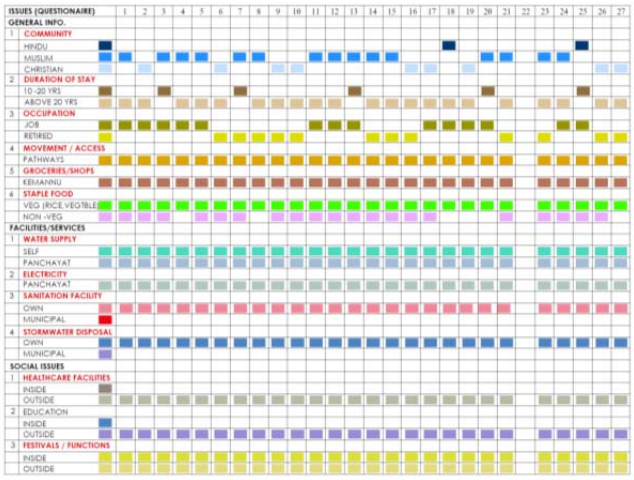


Fig. 5

Primary study:

There was a field survey conducted to identify the various key issues pertaining to the stays in the island.



Questionnaire during the field survey

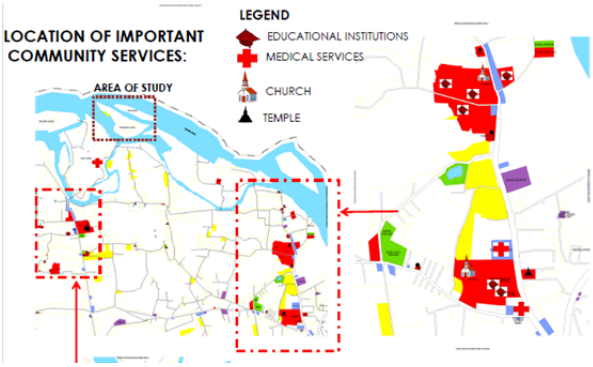
During the survey it was founded that the past population has a stable occupation of agriculture, coconut selling and shell collection and selling. The youth population is getting emigrated to satisfy their educational and job opportunities. It has been observed that the population of the island is decreasing considerably because of the emigration of the existing people who left the island for the sake of job and carrier opportunities. There is no provision of dispensary and shops within the site as a result of which the people had to go to Kemmanu to meet their household demands and health issues.

Site history:

Historically, island development has involved discovery and settlement leading up to occupancy based on hunting, fishing, agriculture, animal husbandry and, less frequently, on extractive mining activities and trade. Modern development perspective is founded more on a technological infrastructure which allows island peoples to pursue livelihoods less dependent on the intrinsic resource base.

Immediate surroundings:

The island does not possess any community services. But there are a few located in the vicinity.



EDUCATIONAL INSTITUTIONS

SL NO	NAME OF THE INSTITUTION	DISTANCE FROM THE AREA OF STUDY (KM)
1	MILAGRES COLLEGE	3.5
2	TMA PAI HIGH SCHOOL	2.8
3	SAINT PHILOMINA HIGHER PRIMARY SCHOOL	1.8
4	SALIHATH ENGLISH MEDIUM SCHOOL	2.4
5	CARMEL ENGLISH HIGHER PRIMARY SCHOOL	1.3

MEDICAL SERVICES

SL NO	NAME OF THE INSTITUTION	DISTANCE FROM THE AREA OF STUDY (KM)
1	THONSE HEALTH CENTRE	2.4
2	GORETTI HOSPITAL	5
3	KEMMANU MEDICALS	1.2
4	VEDAM AYURVEDA MULTI SPECIALITY HOSPITAL	6

Fig. 6

Demographic study:

There are 110 nos. of people staying at the island. (Fig. 7).The percentage of adults and elderly people is more than the children. Over the years, owners of the farms have observed a decline in the prices. This has led to setting up of various businesses in nearby cities. (Fig. 8).The youth population is declining in order to fulfil their educational needs. It has been observed that, after education they have been settling away from the island due to lack of job opportunities within the above mentioned area.

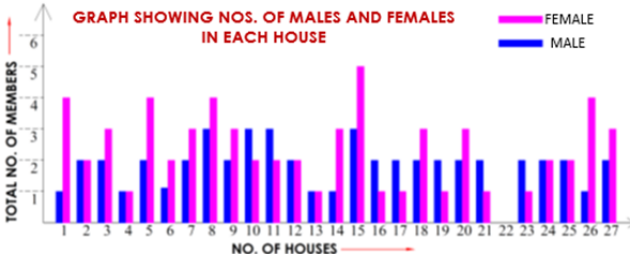


Fig. 7

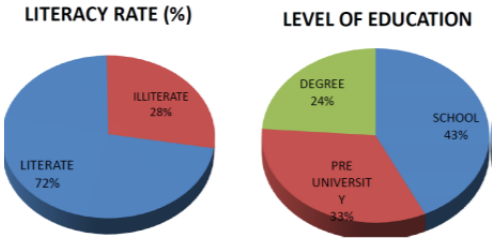


Fig. 8

Existing zoning:

No definite zoning throughout the site. The land owners acquired their land without any definite boundaries and demarcations. Due to dense coconut plantations, it is difficult to identify the acquisition of land and the open and integrated spaces around it. (Fig. 9).

Fig. 9

PATHWAYS: The pathways present are all man made and are according to the convenience of the users.(Fig. 10)

Fig. 10

SERVICES: All the services existing and supplied to the island have been shown below. (Fig. 11)

ELECTRICITY: All the houses and the religious buildings have power connection from the main line. Electricity is available during most part of the day &night. Around one hour power cut per day is consistent.

Absence of street lights on the island. Only one to be found at the entrance of the island. Residents severely affected by this as proper road is inexistent. The electric power is not sufficient at times to operate the modern gadgets.

TELECOM: BSNL landline connection is used by many of the residents. **M**ajority of them depend on the mobile network which functions well on the island.

WATER SUPPLY: Each house on the island has the panchayat water connection and a well in the premises. The supply duration is about 4-5 hours a day. Water consumption is around 100-120 liters/person /day water expense is in the range of 60-120 Rs/ month. Water problem exists only due to power cuts at pumping station but with negligible frequency.

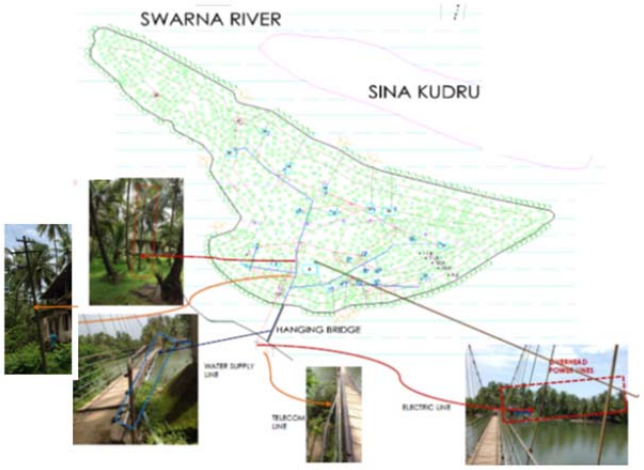


Fig. 11

WASTE DISPOSAL: Lack of proper waste disposal system.

Both the organic waste & plastic waste is either littered in the surroundings or let into the river. (Fig. 12)

Fig. 12

SEWAGE: The houses on the periphery dispose the sewage into the waterbody directly. In majority of the houses the waste water from kitchens, bath etc. is let into the surrounding area without any treatment. Interior houses have an individual septic tank. An initiative has been taken by the government to encourage hygienic practices by funding the construction of septic tanks.

(Fig. 13)

Fig. 13

Secondary study:

The secondary study focusses on the study of best sustainable practices for the development of River Island. The study results in analyzing an integrated approach towards sustainable living incorporated for that island considering its topography, existing conditions and its biodiversity. Governors Island, New York city is a case study taken to understand the basic fundamental aspects of sustainable development. (Fig. 14)

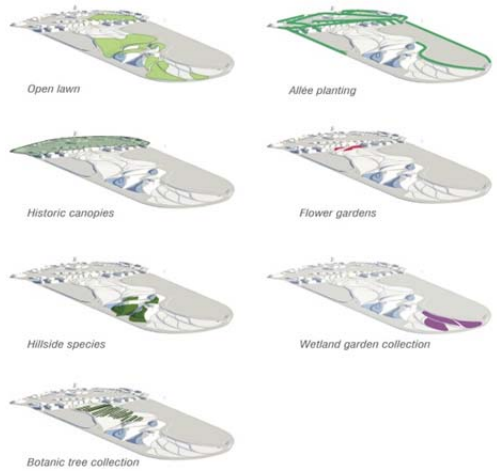
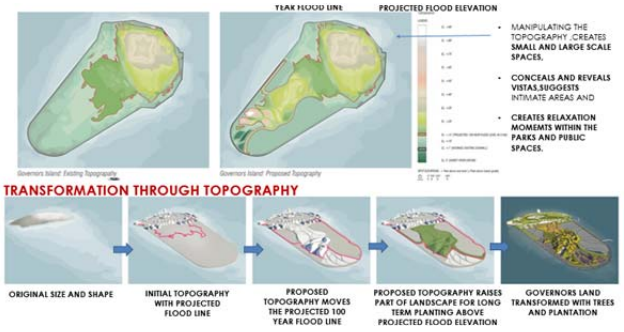


Fig. 14

The Governors Island is a dramatic transformation of once-abandoned island and accentuates the qualities of this unique place, transforming the island into both a destination and landmark.



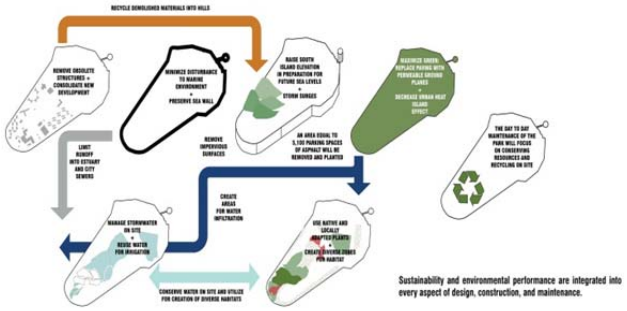


Fig. 15

Sustainability and environmental performance are integrated into every aspects of design, construction and maintenance (Fig. 15)

Analysis:

The original topography had undergone several morphological changes so the proposal for the future development was based on projected for another hundred years of flood line.

The proposal involves removal of old structures thereby consolidating new development plan. Since it was a river island, preservation of exterior wall was kept in mind with minimal disturbance to the existing marine environment.

To sustain the existing flora and fauna, the proposal maximizes open green spaces and replaces paving with permeable ground planes to reduce the impact of head island effect.

The principles of sustainability and environmental performance were integrated into all aspects of design proposal, construction techniques and maintenance methods.

Landscaping was done of native vegetation thereby creating diverse zones for habitats. Strategies for conservation of storm water on the site and reuse the same for irrigation is also incorporated as a sustainable practice. The circulation throughout the island is made defined thereby separating the vehicular and pedestrian movement giving priority to pedestrians and bicyclists. The proposal best deals with the topography by playing with the forms by creating large and small spaces or pockets with experiential quality of light and shades.

Formulation of guidelines:

The following are the set of guidelines framed in order to achieve sustainable development of the island:

- Promote growth of mangroves along the periphery of the island to reduce the chances of flood entry and soil erosion.
- Islanders must be educated to adopt eco-friendly way of living.

- Creation of effective / strong awareness program, pamphlets on environmental awareness and education.
- The local environment awareness on tropical vegetation, flora and fauna etc. is made an integral part.
- Community participation in growing suitable species of plants which can bind and stabilize the soil.
- Conservation work in the islands is unlikely to succeed in the long term without the support of the local people. Promote ways to keep the islands clean and enjoy the beauty without disturbing or destroying it
- Utilize natural resources to generate energy
- Collection of non-biodegradable wastes and reuse of biodegradable wastes.
- Improve their standard of living and by improving the basic living needs. Improve economic standards by educating them in promoting the local culture.
- All newly proposed construction should have thatched roof or tiled sloping roof.
- Promote nature walk and to avoid fuel based vehicles, can be replaced with bicycles
- Retain, reuse the building material for construction.
- Use locally available materials, materials like bamboo, coconut shells, coconut and palm leaves for construction.
- To promote local handicrafts made by the ladies community during their leisure time.

Development proposal:

The development proposal includes the following key features:

Development of pathways with eco-friendly material (laterite clay pavers) creating a strong linkage and connectivity within the island. (Fig. 16).

Proposing open spaces and community services at strategic locations within the island within the travel distance. (Fig. 17).

Proposing scheme for rain water disposal. (Fig. 18).

Proposal for waste water management within the island. (Fig. 19).

Proposal of temporary flood shelters which can be used as amenities & activity center. (Fig. 20).

Proposal for mini bio gas plant for disposal of organic wastes from kitchen. (Fig. 21).

Proposing sustainable method for disposal of dry coconut leaves within the site. (Fig. 22).

Fig. 16

Fig. 17

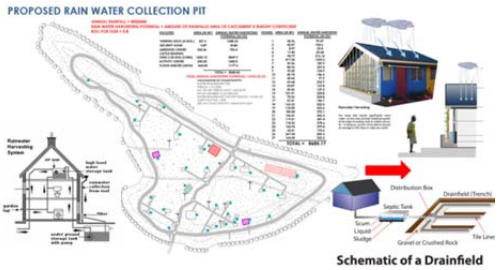


Fig. 18

Fig. 19

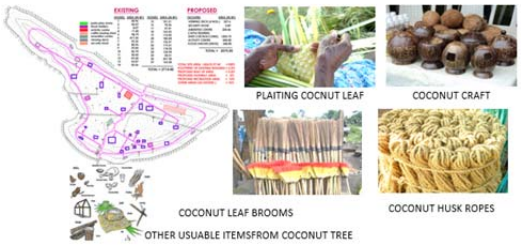


Fig. 20

Fig. 21 **Fig. 22**

Feasibility analysis:

The overall detailed out cost of the proposed project is found to be say Rs.12,50,000.(twelve lakh fifty thousand) (Table-1).Table -2 shows a comparative analysis of conventional LPG gas and mini bio gas plant. There are 27 families residing at the island, each family have to contribute say Rs.46,000.(forty-six thousand) initially yearly or Rs.3,800 (three thousand eight-hundred) monthly. The approach is sustainable as though the initial cost is high for the inhabitants but over a period of 10 years and they can gain a substantial amount by earning through the handicrafts.

ESTIMATED COST OF THE ENTIRE PROPOSAL

Proposed structure	Cost through conventional methods	Cost through sustainable approach
Amenities Centre	Rs.6,32,938.32	Rs.1,10,503.00
Public toilet (4nos)	Rs.83,184.00	Rs.37,720.00
Activity Centre	Rs.9,04,197.60	Rs.1,55,004
Pathways	Rs.26,13,011.52	Rs.9,33,218.04
Security kiosk	Rs.49,730.86	Rs.8,525.22
Total cost:	**Rs. 42,83,062.30**	**Rs. 12,44,970.26**

Table -1

COMPARATIVE COST ANALYSIS OF MINI BIO GAS PLANT

CONVENTIONAL LPG GAS	MINI BIOGAS PLANT
The gas stove and burner at intial purchase= Rs.2000/- The cylinder filled with gas = Rs.600 /- per month	The initial cost of materials purchase : Rs.1000 Burner = Rs.600
consumption of LPG throughout the year = Rs.2400 /- i.e. 58 kg	No filling required Consumption of biogas throughout the year: From 1kg kitchen waste 250 gm of biogas Monthly consumption : 4.8 kg (around 19 kg waste)
Total cost : Rs.4,400	**Total cost : Rs.1,600**

Table-2

4. CONCLUSION

The paper proposes an integrated approach for the people to improve livelihoods and human well-being through sustainable methods and management, ensure protection of natural ecosystem in a sustainable way. If the intervention can be implemented in a methodical way, there is a scope of improvement in the existing life style and fostering community living and enable the islanders to be self-sustainable.

5. ACKNOWLEDGEMENTS:

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