

Pilgrimage on the Ocean - Development of Sagar Island, Bay of Bengal

Dr. C. M. Basak, Ph.D.

Associate Planner

Kolkata Metropolitan Development Authority

Ummayan Bhaban, Salt Lake city

Kolkata 700 091

West Bengal, India

E- mail: cmbasak@hotmail.com

Abstract - The Ganges is a sacred river rising from the Himalayan glaciers at Gangotri and flowing partly through eastern India and partly through Bangladesh. There are many religious places along the banks. Also there are numerous cities and millions of people live on the two sides of the river. This mighty river flows through a delta, which is the largest in the world. She takes the name of Hooghly and drains in the Bay of Bengal. At the lower Gangetic delta receives silt from upstream and over the years many small islands have appeared in the Bay of Bengal, at the mouth of the river Sagar is such an island whose history dates back to 3000 B.C. These islands face natural disasters; have mangrove forests and interesting biodiversity. On the 14th of January every year pilgrims come from all over India, quarter million people on the average but sometimes one million or more, to pray at a small temple facing the Bay of Bengal.

Environmental Plan: Sagar Island (38 km x 8 km) has a floating population and the pilgrims come from transit points. A temporary city is built and several environmental programmes have been taken up like embankment, prevention of soil erosion, conservation of historic areas, afforestation, waste disposal scheme etc. However, it was found that both transit/temporary plan and a long-range development plan are to be prepared. While the temporary plan focuses on transit camps, sanitation and facilities for pilgrims, the long range plan covers land use, deer and marine parks, plantations, helipad, plan for agriculture, fishing, tourism etc. Solar energy and wind power have been introduced. Under the coastal regulations of Govt. of India guidelines have been provided. There are now proposals for development of other islands with improved water transportation system. New islands are coming up and dredging at the mouth of rivers in the bay is difficult and expensive. It requires study of the ecosystem.

Conclusion: The environment plan for Sagar Island will create new marine environment with conservation of natural resources and ecology, improvement of coastal amenities and eco-tourism.

I. INTRODUCTION

Sagar- deltaic island at the mouth of the river Hooghly (Bhagirathi, Ganga) falling into the Bay of Bengal, and of immense historical background is famous for the Gangesagar Fair around Kapil-Muni Temple, located on the southernmost tip of the Island overseeing the Bay of Bengal. It is separated from the main land by a number of branches of the river Hooghly and have a number of arterial canals in between them, through which tidal waves flow. The area constitutes the western fringe of the famous

'Sundarban forest'. Sagar Island dates back to 3000 B.C. The Islands face natural disasters, have mangrove forests and interesting biodiversity.

Sagar Island is a large island with an area of around 300 sq km spread over 43 villages and a population of over 185600. It is situated 110 km. south of Kolkata. A regular ferry service links the Island with the mainland, which is 6 km. away across Muriganga River. The elevation of the central part of the Island is 2.22 to 2.23 meters and that of the peripheral portion is 2.18 to 2.22 meters from 'mean sea level' [1].

It attracts thousands of devotees from all over India every year, especially during the Ganga Sagar Fair. A temporary city is built. They come for a holy dip on Makar Sankranti (last day of a Bengali Calendar Month) on the 14th of January and offer their prayers at the Kapilmuni Temple. Ganga Sagar Fair is the largest fair in West Bengal and lasts only over a night and morning. This is an occasion of great unity and integrity. This activity involves almost all the Government departments, local bodies, scores of non-government voluntary organizations for a period of over a fortnight.

It is observed that a visit to Sagar Island with a view to spending week-ends is getting popular day by day. The State Government is also very keen to utilize this opportunity to identify and develop this Island as an attractive tourist area in the future.

The 30 Km long State Highway extending from Kachuberia to Gangesagar is the only road for communication in the Island excepting the kutchha (temporary) village roads and brick paved roads linking this main road. Most of the population has migrated from the adjoining Midnapore district and belong to lower income group. The important markets here are Chemaguri and Rudranagar. The Sagar Block headquarter is located at Rudranagar which is centrally situated in the Island. The two main entry points of the Sagar Island are at Kachuberia and Chemaguri, located at north eastern tip and south eastern corner respectively. These two points are connected through cross river transportation by vessel/launch services from the main land at Lot No. 8 (Kakdwip) and Hardwood point (Namkhana) on the north and south. Fig. 1. shows the Sagar Island and its adjoining areas.

The area of the Fair ground is about 10 sq. km.- like an inverted saucer, with the wide sea opening in front forming the beach, and the back is covered by dense jungle. Entire arrangement for the Fair has to be brought from the main

land. Annual monetary involvement during the Fair is about Rupees (Rs.) 20 millions (1 US\$ = Rs.45.00) of which only 20 % is spent on permanent assets. About 67500 man-days' of jobs are created in the informal sector during the occasion of Fair excluding the shopkeepers etc. within the Fair complex.

General Economy: Sagar Island is rich in agriculture, cash crops like sweet betel leaf, watermelon and green chili. There are about 12000 farms of sweet betel leaf fetching good foreign money. Farming and fishing are the main occupation of the Island people.

II. OBJECTIVES

- i) To minimise recurring expenditures through facilitating permanent assets and sharing the augmented local assets.
- ii) To facilitate generation of year round activities (Tourism, commerce, industry, institutional) so as to make the above permanent assets cost-effective
- iii) To conserve, preserve, and upgrade the environmental structures.
- iv) Improvement of local heritage, culture, production, skill, and commerce for employment generation, economic upgradation and diversification.
- v) Application of Science and technology for the development of this isolated Island.



III. ENVIRONMENTAL PLAN

To achieve the objectives it is necessary that both a transit/temporary plan and a long-range development plan are to be prepared. While the temporary plan focuses on transit camps, sanitation and facilities for pilgrims the long-range plan covers the development of entire Sagar Island and transit points in the main land.

It has been observed that planning and development for the Fair Ground alone will not help to make proper assessment without considering its surrounding areas. Therefore Sagar Police Station (P.S.) in full and part of Kakdwip and Namkhana P.S., which are in direct influence during the festival, have been included and is named 'Sagar Island Planning Area' (SIPA).

Proposed SIPA covers nearly 581 sq. km. in 46 mouzas (smallest rural unit) of Sagar P.S., 23 mouzas of Kakdwip P.S. and 21 mouzas of Namkhana P. S. totalling 110 mouzas.

Future population: The population of SIPA in 2001 was 410500 [2]. The projected population is likely to reach 509000 and 630000 in the year 2011 and 2021 respectively [3].

IV. DETAIL DEVELOPMENT PLAN OF GANGA SAGAR FAIR GROUND AND ADJOINING AREAS

A. Layout

Provides guidelines for future development of the Fair area and its environment, indication of permanent features like pilgrim sheds, latrines, tourist cottages, government uses in order to reduce some of the recurring expenditures along with the construction of temporary structures, bus stands and private car parking facilities, provisions for Air strip and Helipad, streets and avenues alignments, keeping the temple at the climax. Fig. 2 shows the details of The Development Plan of Ganga Sagar Fair Ground and Adjoining Areas.

The Plan further covers arrangements for water supply, sanitation, accommodation, electricity-lighting-power supply, police and security, fire fighting, public address system and information, life saving squad, surface and river transportation, telecommunication, court and jail etc.

B. Entertainment Areas

Large areas allocated for mini zoo, aquarium, gene-parks, bathing facilities, entertainment parks, boating and shipping.

C. Conservation

Areas have been identified for environmental conservation, upgradations of canals, bunds, erosion control, afforestation, heritage areas, coastal landscaping and beautification of the entire area.

D. Outdoor Facilities

Organized open space, recreational areas, beach development, water sports, powerboats, and ships for deep-sea pleasure trips.

A boating front on the hard beach located at the western part of the complex starting from the area where the Sagar Nadi (river) meets the Bay of Bengal.

E. Augmentation of revenue generation:

- i) From Pilgrims and allied users,

ii) From Non- pilgrims.

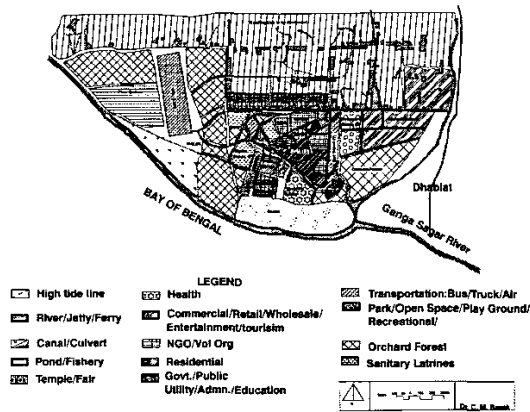


Fig. 2. Detail Development Plan of Ganga Sagar Fair Ground and adjoining areas

V. DEVELOPMENT PLAN FOR SAGAR ISLAND

A. Development Proposals

Development proposals have been evolved on the basis of the identified important features indicating potentiality for development with special considerations on Ganga Sagar Fair, Environment and Tourism. The plan in general indicates: i) Major road system in the Sagar Island, ii) Identification of the emerging urban centers, iii) Identification of areas including areas of tourists attraction, detailed development plans including identification of quite a few areas for future development particularly for environment protection, introduction of new activities like tourism, forestry, fisheries and industries of various categories as well as processing center based on local produce including marketing direction for rapidly growing urban areas.

B. Emerging Urban Areas and Control thereof

With rapid population growth, improvement of agriculture and other productions, the Sagar Mela as a regular catalytic phenomenon, introduction of non-agricultural activities like industries, commerce and tourism, geared up further by envisaged improvements in all aspects of infrastructure systems – Sagar Island is showing clear indication of urbanization in strategic locations.

C. Identifications

Urbanizing areas (rural areas in transition) have been identified by standard Census guidelines

In order of ranking they are: Rudranagar (JL No. 26), Purusuttampur (41), Krishnagar (29), Kachuberia (6), Sibpur (43), Bishnupur (74), Khas Ramkarer Char (28) and Gangasagar (38) all in Sagar Police Station; Lot 8 in Kakkdwip P. S. and Narayanpur in Namkhana P. S.

Development Plans are essential for all the emerging urban areas which includes :

- a) Land Use control and Building Rules
- b) Power, drinking water supply, drainage, garbage and health facilities.
- c) Transportation network and educational and public facilities.

Coastal Regulation Zones as defined under environment (Protection) Act 1986 with subsequent Supreme Court Order restricts certain activities within 500 meter of the high tide line.

D. Proposals for Shelter

A study shows that nearly 200000 pilgrims want to stay in the night shelters in the Fair Ground; the remaining ones get spread over other transit points and in other accommodations, like ashrams, hotels, hostels, guest houses etc. Further there should be a limit of the number of people staying in a crowded place for various strategic hygienic and management reasons. At present the Sagar Panchayat arranges temporary shelters for around 50,000 pilgrims.

Important considerations: i) the shelter should be protected against chilly winds, cyclones, rains and fire, ii) The local people throughout the year may share part of the pilgrim facilities.

E. Recommendation

- i.) In case the existing arrangements appear best, however, gradual shift to prefabricated units of Aluminum curved semi-circular sheets may be considered.
- ii.) Permanent shelters may be used by different users including students, Government and other officials during rest of the year. The remaining shelters will be temporary as at present.

VI. ELECTRIFICATION OF SAGAR ISLAND

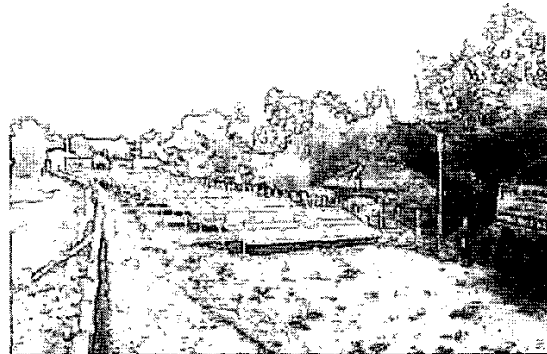


Fig. 3. View of Mrityunjaynagar Power Plant

A. Non-Conventional Energy Sources

The non-availability of grid power is one of the major drawback in the development of Sagar Island and the

desired tourism in the Island. Even a few years ago the entire area used to remain dark in the evenings. During Ganga Sagar Fair, diesel generators were used for necessary services. Therefore without the help of science and technology the improvement of this Island cannot be carried out. The West Bengal Renewable Energy Development Agency (WBREDA), since 1996, is working to illuminate two major islands of the Sundarban region i.e. Sagar Island and Moushuni Island with different renewable sources of energy. Till July 2002 WBREDA has installed 9 off-grid stand-alone Solar Photo Voltaic (SPV) Power Plants in the island [4]. More than 1000 families are getting grid quality electricity from Solar Power Plants through local mini grid. Fig. 3. gives a view of the Mrityunjaynagar Power Plant.

To day, hospital services, water supply, etc. at Sagar Island are being served through solar energy to some extent. The Solar generated electricity constitutes more than 50% of the total electricity consumed in Sagar Island. Another 1,500 families are also using Solar Photo Voltaic Home Lighting Systems. This has brought about a sea change in the daily life of the people of this Island.

B. Unique Features of SPV Programme at Sagar

The distinguishing feature of the SPV Programme at both the islands is the integration of power and water supply systems in these projects. The power plants have been so designed to drive low cost conventional water pumps of average 3 Horse Power (HP) capacities with an intelligent controller during daytime to provide drinking water without incurring any extra cost, except installation of some additional SPV modules. Around 700 families are getting the twin benefits of such integrated power and water supply systems at present in the twin Islands of Sagar and Moushuni.

C. Wind-Diesel Hybrid Power Plant

WBREDA has explored harnessing of Wind Power in the Sagar Island by installation of Wind Diesel Hybrid Power Plant to provide more electricity to the people. Sagar Island falls under the moderate wind speed zone of India. It has an annual average wind speed of 18 kilometer per hour at 30 meter hub height and a wind power density of 176W/ M² with a potentiality of 18 MW Power. However, this is not possible because of non-availability of grid power in the Island. To reduce the consumption of diesel in a Diesel Generator Set by injecting wind energy in the system whenever wind is available in a hybrid model, with an intelligent controller continually measuring the wind speed and instructing to diesel Engine – when and how much power to be generated from diesel. Initially (2002) the plant generated 200 KW of power, catering to the needs of 6 virgin villages of Sagar Island. About 200 consumers of Sridam and Bus Stand area of Sagar Garm Panchayat were provided with electricity connection. The second phase (2003) of this project is supplying average 500 KW of power ensuring 12 hour power supply in major part of the Island including large commercial area of Sagar Island, i.e. Kalibazar, Bagbazar and its adjoining areas. This year (2004) Sridam and Ganga Sagar colony of Bus Stand area have come under extension and providing electricity to 500 additional consumers. For management

of the consumer services Sagar Island Wind Diesel Hybrid Power Plant Beneficiary Society has been formed.

Sagar Island Wind Diesel Project basically comprises 2x160 KVA diesel generator hybridized with 10 numbers 50 KW wind electric generator. The wind diesel controller has been developed by Atlantic Wind Test Site. This controller named Wind Diesel Integrated Control System, is the heart of the Hybrid System. It regulates the power output. The project is being set up at Ganga Sagar Gram Panchayat area of Sagar Island. It is estimated that approx 27000 litres of diesel can be saved annually for running 4 hours daily once the project is commissioned [5].

The social benefits that will result from the proper implementation of this project cannot be assessed only in direct financial terms, but its long term benefits such as improved literacy, development of cottage industry, health care unit etc will have direct impact on the social upliftment and standard of living in the area.

VII. AGRICULTURAL LAND

A. Salinity

The salinity of the soil is due to the inundation of land with seawater. Nearly 80 percent of total cultivable land of this island is coastal low land. Due to presence of many constraints like salinity, impeded drainage, lack of irrigation potentiality and communication problems, most of the areas are monocropped. In the rainy seasons the salinity of the water of the tanks decreases due to dilution with atmospheric fresh water and turn to brackish water as observed in some lined tanks. This water is used for cultivation. Therefore, available surface water is limited.

B. Remedy

Renovation of existing drainage system and construction of new drainage system is needed to improve prevailing water logging condition as well as bringing down the salinity of surface water bodies.

Harvesting rain water in large lined tanks, small dams and derelict canals/ tidal creeks for irrigation of crops.

Further, construction of sluices/dams in certain suitable portion of the active tidal creeks to facilitate mixing of seawater with rainwater, which can be used for cultivation.

VIII. COASTAL EROSION

A. Regional Context

The Hooghly Estuary is the abandoned part of the lower deltaic plain of the Ganga-Brahmaputra river within India and is also turning destructive since early 20th century. In view of this, it is presumed that the erosion in this coastal tract will continue especially in the absence of mangrove forests [6].

Both the southwest and southeast corners of the Sagar Island are under active erosion.

In the southeast corner of the Sagar Island, the Shibpur-Bokkhali-Dhablat sector is the worst affected area – the 'high water line' (HWL) has shifted inland nearly 300 meters from June 1986 to 1999, completely washing out the dunes present in the area. In 1986 there were rows of dunes of height 7m to 9m. The earthen or brick paved embankments do not withstand the thrust of the wave,

especially during the spring high tides of the rainy season. Every year the embankment shifts further inland..

B. *The measures*

- a) Minimum possible gradient in the sea facing side of the embankment;
- b) Intensive mangrove plantation from the base line of the embankment up to the 'low water line' (LWL) during winter season. The clayey substrate supports mangrove colonisation. Subsequently, the mangroves will act as a buffer zone between the sea and the embankment as the stilt roots of the mangroves act as silt catcher.
- c) Mangrove forests are of vital ecological and economic importance. They protect the land against erosion and greater attention is needed for regeneration and exploitation of these forests. A mangrove swamp may give rise to a non-littoral forest, as the silt accumulation is a regular process and land level rises gradually above tidal influences. In such areas some economic species of non-mangrove type can be introduced [7].

IX. COASTAL HAZARDS

Due to closeness to the sea, the island is frequently affected by the nor'westers and cyclonic storms generated from the Bay of Bengal. The cyclones at times bring in high tidal bore causing damage to the existing earthen/brick lined dykes, producing devastating results. As a remedial measure such embankments can be built with the help of modern technology and skill.

The sea front part of Sagar Island is characterised by the presence of beach and beachfront dune complex. Conservation and management of dunes in the beach face-dune complex is necessary to avoid natural disaster caused by the coastal hazards. The following measures can be taken up:

- i.) The barren beachfront dunes can be stabilized with vegetation e.g. with sand loving creepers or grasses. This would arrest the remobilization of the sand from barren dunes with the onset of southwest wind during summer season. The Casurina trees in general, attain a very good height on their full growth. These tall plantations are sometimes unable to withstand the thrust of the strong south west wind and get uprooted, affecting the dunes. To avoid this, some other species of casurina trees of low height along with creepers with good sand holding capacity could be planted.

- ii.) Further, low height check dam can be built inland along the remobilized sand boundary to act as a second line of defence and safeguard against serious flooding during storm surges and also check the spreading of remobilized sand further inland like 'Roman bank' of Lincolnshire coast [8].

X. FOREST COVER AREA

Sagar Island is almost devoid of any forestland. Such land covers only 2.59 sq. km. in the southern part of the Island. Typical mangrove shrubs (mainly 'Hantal' and 'Bani') are present in the linear stretch behind beach-dune complex zone from Gangasagar village (in the east) to Baguakhali village (in the west). Proposals to increase such land is given in the Development Plan for Sagar Island.

XI. CONCLUSION

The environment plan for Sagar Island will create new marine environment with conservation of natural resources and ecology, improvement of coastal amenities and eco-tourism.

The development and management of the Island will depend on scientific planning for the optimum and sustained utilization of resources. Environmental audit at regular intervals is to be carried out for ensuring proper management of tourism and agricultural output. Thus the economy of the Island can be improved to a great extent.

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