

Current status of essential infrastructure and facilities in landing centers of Andaman group of islands, India

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ABSTRACT

An investigation was carried out to collect thorough data on infrastructure and facilities available in the landing centers of the Andaman groups of Islands. The present study was conducted from September 2019 to February 2020 in South Andaman, North Andaman, Middle Andaman and Little Andaman, covering 34 major and minor landing centers. Information was primarily collected by observation method as well as interviewing the fishermen. A set of questionnaires were followed for discussions with the auctioneers and middleman for more data to support the survey. The extent of availability of essential infrastructures and facilities was measured by assessing twenty-six criteria of a landing center. Availability of these twenty-six criteria is measured in a three-point rating scale viz., adequate, partially adequate and not adequate, having scores of 3, 2 and 1, respectively. The availability index of infrastructure and facilities was evaluated through percentage and mean \pm SD. The analyses of infrastructure and facilities give the highest availability index (Mean \pm SD) for Junglighat landing center, followed by Rangat Bay, Mayabunder and Durgapur landing center, respectively. In contrast, Lohabarrack, Ramnagar and Ramakrishnapur are ranked lowest. The overall availability index in all thirty-four landing centers shows high infrastructure availability in weather warning service for fishermen, approach roads, and transportation facilities, whereas a significantly lower availability index in waste disposable facilities, cold storage facilities, potable water availability and fueling facility.

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1. Introduction

The largest archipelago in the Indian Ocean, the Andaman and Nicobar Islands (ANI), consists of 572 islands, islets and rocky outcrops, possessing 24% of India's coastline, which measures 1912 km and encompasses 0.6 million km² exclusive economic zones (EEZ); about 28% of Indian's EEZ (Advani et al. 2013; George et al. 2013; Roy et al. 2017). In addition to coral reefs, the vast extensions of mangroves and seagrass meadows make ANI a diverse marine habitat, supporting a rich ichthyofauna diversity (Roy et al. 2017). Ranjan et al. (2013) listed 1434 fish species from ANI water, out of which approximately 400 species are commercially significant as food fishes. These coastal and marine resources are essential in both livelihoods and ecological related contexts. The fishing industry of ANI supports a substantial portion of these island's economy (Shirke et al. 2018). Over the decades, fishing at ANI is mainly aimed at open water pelagic and demersal resources in reefs. Offshore and deep-sea fishing has received significantly less attention in ANI (Rajan 2003). The marine fishery sector is highly underexploited, despite having a rich amount of harvestable fishery resources. Even though the harvested catch's estimated potential is around 1.48 lakh tonnes per annum, the current marine landings constitute a meagre of 39,000 tonnes, only 26% of the potential catch (Roy and George 2010; DAHDF 2019). Major limiting factors for fishery growth in ANI are the remoteness and lack of infrastructural facilities for fish handling and marketing (Tahir 1988).

Fishing villages in the Andaman Islands were commonly situated on the eastern coast of the larger Andaman Islands in the 1960s. However, these fishing villages are nowadays dispersed across islands like Little Andaman, Havelock, Neil and Long Island. Many of these villages are not even

adjacent to the sea; they are connected to it by creeks cutting through mangroves. (Advani et al. 2013). There are 169 fishing villages in ANI with 5944 fisherman families and a fisherfolk population of 26521. Among them, fishermen engaged in fishing activity is 14839 (DAHDF 2019). The total number of licensed fishing vessels is 3573, of which 1453 non-motorized traditional fishing vessels, 2006 are motorized non-mechanical vessels, and 114 crafts are motorized mechanical vessels. Fish markets of ANI constructed by the department of fisheries, number 19. ANI is having 51 landing centers (DAHDF 2018).

The fish landing centers are the preliminary center for fish handling, and they can be considered an interface between the harvesting of a fish and its consumption (Sciortino 2010). The fish caught from different sources are stockpiled in this place and thus transported to local markets through various intermediary channels (Chandra et al. 2011). Hence, the type, size, and infrastructure of the landing centers; considerably influence fishery development and effective utilization of fish catches (Sciortino 2010). The limiting infrastructure, craft, gear, and fisheries resources techniques result in low productivity and high waste and spoilage (Ben-Yami and Anderson 1985).

The fish landing sites should be conveniently located at a considerable distance from the fishing grounds; to provide the fishing vessels with safe mooring in all weather conditions, even in all states of the tide. The sites should be established where fishing grounds and market outlets are easily accessible (Pizzali, 1988). The rudimental services necessary at a small-scale fishery landing center are considered as (1) Services for vessels and crews (for unloading the catch, stacking fishing gear, fuel, water, ice, supplies, etc.), (2) Bunkerage (a basic diesel or petrol fuel station), (3) Engine and boat repair area (facilities to fix

the vessels onshore) (4) Fishing gear repair area (a shed for the repair and storage of nets and other fishing gear), (5) Berthing services (with freshwater outlets, electricity supply outlets etc.), (6) Food supply and washroom facilities (desirable to provide a takeout canteen, a fishermen's food store; and sanitary facilities, including toilets and showers, are essential to ensure the maintenance of hygiene standards and the comfort of the fishers), (7) Fish handling, marketing and processing facilities (ice, cold storage, sorting areas, processing facilities, local markets etc.) (Pizzali 1988).

2. Materials and Methods

2.1. Selection of the study area

Andaman and Nicobar Islands is a union territory of India, located between 6° to 14° N latitude and 92° to 94° E longitude in the North Indian Ocean. The study was conducted from September 2019 to February 2020 in three major areas - North Andaman, Middle Andaman and South Andaman. The capital city of Andaman Islands, Port Blair, situated in South Andaman (11.7401° N, 92.6586° E), was selected as a reference point. Middle Andaman (12.5610° N, 92.8178° E) and North Andaman (13.2039° N, 92.8976° E) are located at a distance of 230 kilometers and 300 kilometers away respectively, from Port Blair city by road. Little Andaman (10.7449° N, 92.5000° E) is 120 kilometers from the reference point, accessible by ship only.

2.2. Landing centers studied

Table 1. Landing centres visited in Andaman islands

South Andaman	North Andaman
1. Junglighat	1. Durgapur
2. Guptapara	2. Aerial Bay
3. Panighat	3. Kalipur
4. Wandoor	4. Swarajgram
5. Dignabad	5. Radhanagar
6. Wright Myo	6. Shyamnagar
7. Chatham	7. Kalighat
8. Burmanallah	8. Ramnagar
9. Lohabarrack	9. Kishorinagar
10. Corbyn's Cove	
11. Chidiyatapu	Middle Andaman
12. Chouldari	1. Mayabunder
13. Shoal Bay	2. Tugapur
	3. Chainpur
	4. Betapur RRO
	5. Rangat Bay
	6. Bakultala
Little Andaman	7. Yeratta
1. Ramakrishnapur	8. Uttara
2. Vivekanandapur	9. Baratang
3. Hutbay / Machidera	

2.3. Preparation of interview schedules

Information was primarily collected by observation method and interviewing the fishermen who provided brief information regarding fisheries of that region. A set of questionnaires were followed for discussions with the auctioneers and middleman for more data to support the survey. High-quality photographs of the visited landing center's infrastructure and available facilities were taken. The extent of availability of essential infrastructures and facilities was measured by assessing twenty-six criteria

of a landing center viz. (1) concrete platform/ wharf, (2) berthing structures, (3) pillars, (4) wharf associated steps, (5) water storage tanks, (6) potable water availability, (7) raw water availability, (8) availability of ice, (9) icebreaking machines, (10) cold storage facility, (11) net mending sheds, (12) fish selling shed, (13) fish auctioning shed, (14) administrative building, (15) electricity, (16) a fueling facility, (17) drainage channel, (18) waste disposable facility, (19) hygienic toilet, (20) compound wall, (21) gate, (22) approach roads, (23) transportation facility, (24) parking area, (25) cooperative societies and (26) weather warning service for fisherman. Availability of these twenty-six criteria was measured in a three-point rating scale viz., adequate, partially adequate and not adequate, having scores of 3, 2 and 1, respectively. The availability index of infrastructure and facilities was evaluated through percentage and mean±SD (Balasubramaniam et al. 2009; Shirke et al. 2018).

3. Results and Discussion

Currently, the fishermen of the Andaman group of islands commonly use motorized and non-mechanized vessels. Traditional non-motorized vessels known as Dongi are also very commonly used. A minimal number of mechanized vessels were observed during the survey. The most frequently used fishing gears recorded in the landing center and landing points are Gill net (Ring Jaal), Longliner, Hook & line and Cast net. Seine net and trawl net were also available in a few landing centers. The major fish landings of Andaman comprise Sardines, Anchovies, Carangids, Bombay duck, Perches, Silver bellies, Mackerel, Tunas, Billfishes, Mulletts, Elasmobranchs, Prawns and other crustaceans.

The analyses of infrastructure and facilities gave the highest availability index (Mean ± SD) for Junglighat (2.58±0.74), followed by Rangat Bay (2.50±0.75), Mayabunder (2.50±0.69), Durgapur (2.50±0.64), Guptapara (2.42±0.63) and Hutbay (2.38±0.79) landing center respectively (Fig. 1). These six landing centers stand to have developed infrastructure facilities available compared to other island landing centers. In contrast, Shyamnagar (1.12±0.43), Radhanagar (1.12±0.43), Kalipur (1.12±0.43), Chainpur (1.12±0.32), Shoal Bay (1.12±0.42), Lohabarrack (1.08±0.38), Ramnagar (1.08±0.39) and Ramakrishnapur (1.04±0.19) landing centers are ranked lowest. The observed value demonstrates that there is even a lack of essential infrastructure facilities in these landing centers. The availability index shows the necessity of establishing or developing the infrastructure facilities available in most landing centers of this island.

The overall availability index for infrastructure and facilities in all thirty-four landing centers (Fig. 2) shows high availability in Weather warning service for fishermen (2.88±0.32), Approach Roads (2.32±0.76), Transportation Facility (2.24±0.77). Whereas a significantly lower availability index in Administrative Buildings (1.32±0.58), Hygienic Toilet (1.32±0.47), Electricity (1.29±0.46), Raw Water Availability (1.24±0.49), Ice Breaking Machines (1.24±0.60), Drainage Channel (1.21±0.40). Among all other facilities, Waste Disposable Facility (1.18±0.38), Cold

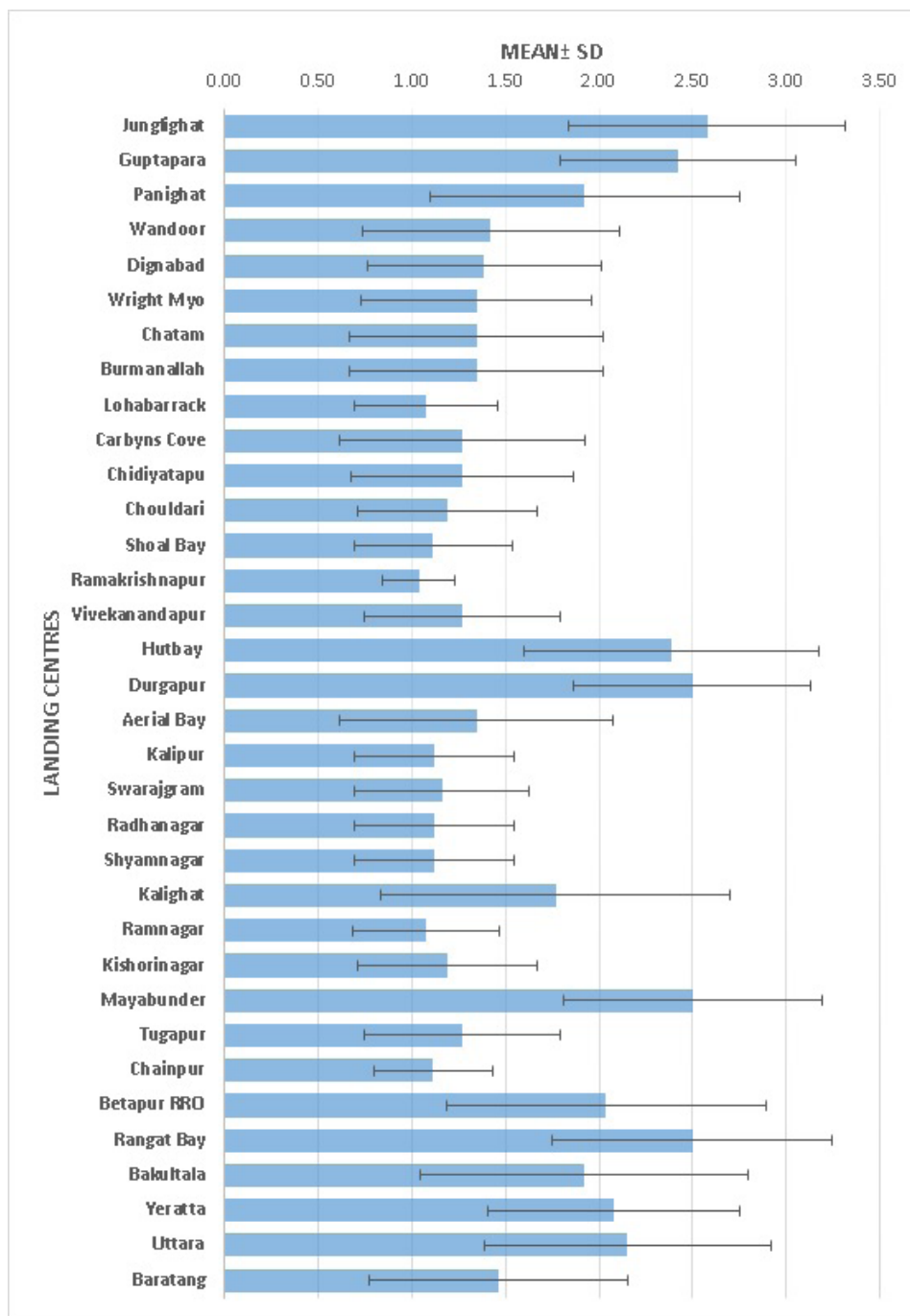


Fig. 1. Availability of infrastructure and facility in the landing centers of Andaman

Storage Facility (1.12 ± 0.32), Potable Water Availability (1.09 ± 0.37) and Fueling Facility (1.06 ± 0.34) were reported to be scarce.

To prevent the spoilage of the catch before landing and further transportation to either local or export markets, the fishermen rely extensively on ice. Fishers from South Andaman have access to factories in places like Lamba line, Prothrapur, Namunanagar, Danikhadi and Dundas-Point. There is one ice factory in Little Andaman placed in Hutbay. Fishers of North Andaman collect ice from the Ice factory established in Durgapur Village and Diglipur town. Due to the remoteness of some fishing villages of North Andaman, such as Swarajgram, Radhanagar, Shyamnagar, Kalighat, Ramnagar and Kishorinagar; they have to rely

on ice cubes made in the household refrigerator, which are also sold in local shops. From Middle Andaman, the Fishermen of Mayabunder have access to the ice factory established in Danapur. Fishers from Tugapur, Chainpur and Betapur RRO also depend on this factory. There is one ice plant in Nimbutala, from where fishers of Rangat Bay, Bakultala and Yeratta collect ice. Fishers from Uttara and Baratang landing centers rely primarily on homemade ice cubes. As fish is a highly perishable food, ice use is crucial, and not having adequate ice could be a limiting factor for the fishermen. If they cannot preserve a large catch, they either discard it or sell it at a lower price.

Among all the landing centers surveyed from the Andaman group of Islands, only the Junglighat landing center

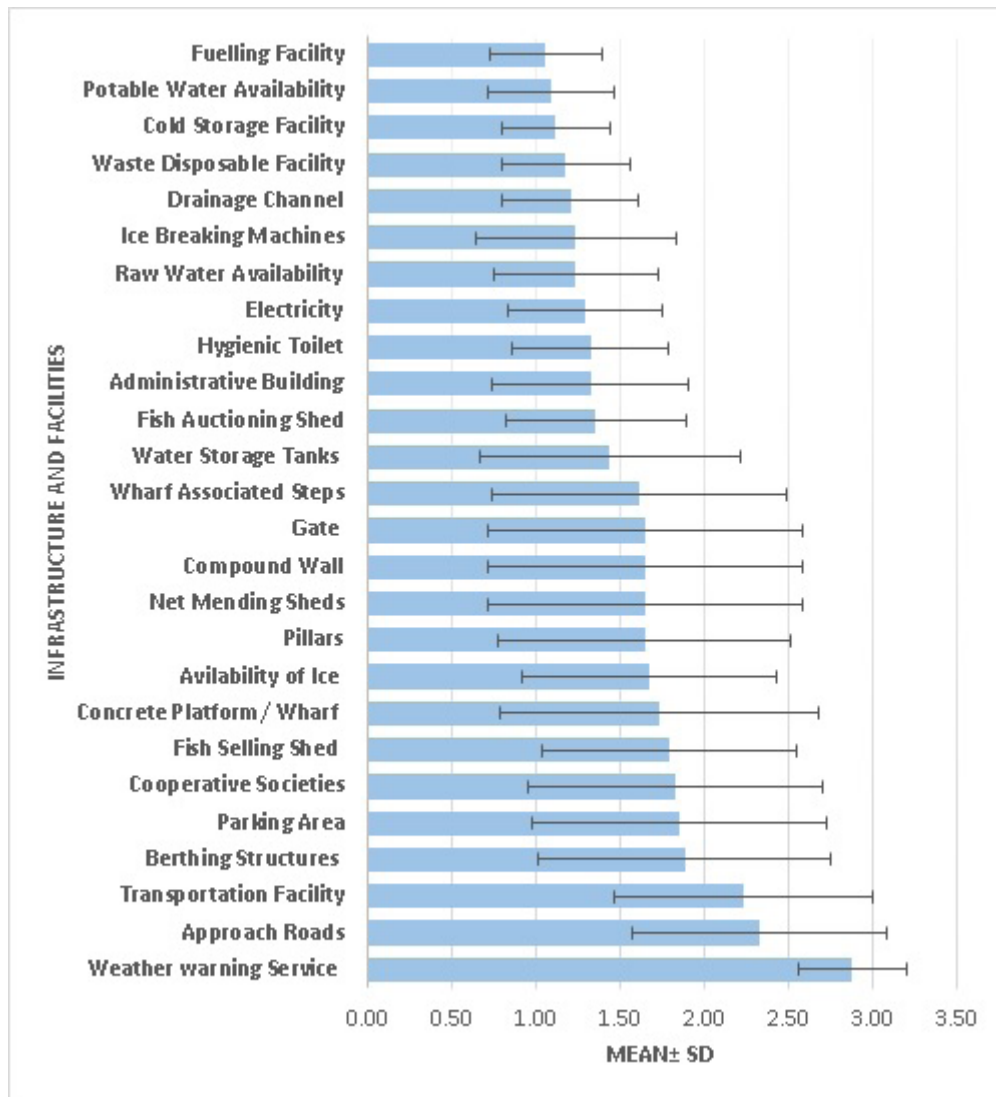


Fig. 2. Overall availability of infrastructure and facilities in the landing centers of Andaman Islands

has its own fueling facility. Except for Junglighat, south Andaman's landing centres mostly depend on the petrol pumps of Bathu Basti, Aberdeen Bazar and Bambooflat. In little Andaman, only one petrol pump is placed in Hutbay. In North Andaman, Diglipur hosts the most easily accessible petrol pump; however, the remoteness of certain fishing villages compels residents to procure fuel from local suppliers at considerably higher prices. Fishermen of Middle Andaman are using petrol pumps of Mayabunder, Danapur, Nimbutala and Rangat.

The landing center controlling administration is either the fisheries department or the Panchayat. For weather warnings such as cyclones, tsunamis, high waves and wind, etc., fishers rely on SMS from the Fisheries Department, Police Department, Television News and radio, and the Coast Guard, Forest Department and Panchayat. Several fish landing centers in the Andaman group of islands have good support from the cooperative societies for auctioning, transportation and selling the catches in the domestic market. However, several landing centers, especially from remote village areas, lack such cooperative societies.

Landing centers with better infrastructure and berthing

facilities can support more vessels and a more significant catch. But due to the uneven distribution of infrastructural facilities in the landing centers of the Andaman Islands, most fishing vessels concentrate on a few landing centers only. Thus, it might pressure that landing center and underutilization of the others. When the catch composition is in large quantities, and many fishing vessels are regularly operating, proper infrastructure for berthing facilities, storage, ice, hygienic handling, fuel, transportation, marketing and other landing center structures are necessary.

Fish products require proper postharvest management to prevent spoilage and maintain quality. Hence, the proper postharvest handling of a catch is a very crucial step. The study recommends establishing adequate cold storage facilities at the landing centers to avoid fish spoilage. The establishment of ice-making plants that the fishermen of remote areas can access will also be appreciated for postharvest handling. Maintaining a hygienic environment in landing centers is necessary to properly market good quality fishery products. The study shows the necessity for the construction of improved sanitary infrastructure facilities. There is a great need to establish a waste

disposal facility, Drainage Channel, Hygienic toilet, and proper supply of freshwater to increase hygiene. Creating awareness and education among the fishermen about the importance of hygienic handling of fish, landing centers, food safety, and general health consideration is essential.

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