

BIODIVERSITY, HUMAN FOOD AND LIVELIHOOD IN ANDAMAN AND NICOBAR ISLANDS

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Abstract

The primitive tribes, rich biodiversity and pleasant sea beaches commend the Andaman and Nicobar Islands not as 'Kalapani' but acclaimed as an 'emerald islands' or 'place for naturalists'. Biodiversity and tribes of these islands lived all together over the centuries and accommodated new immigrants from adjoining landmasses. The floral and faunal resources extended the opportunities to people for getting food, herbal medicine and livelihood. The wheels of modern civilization moved fast since settlement plans which has affected the very basics of nature-human relationship in these islands. The present article briefs the extent of biodiversity in these islands and highlights some of the important issues pertaining to its conservation for benefit of 'people of the land'.

Island Biodiversity: Facts and Figures

The picturesque archipelago of 572 Islands in Bay of Bengal is located between 6° N to 14° N latitude on 92° E to 94° E longitudes. The islands are spread over 800 km as a long and narrow broken arc in North-South orientation from the Arakan Yoma hill range of Myanmar to the Sumatran range of Indonesia. Out of total geographical area of 8249 sq km the islands have 86.2% area under luxuriant evergreen tropical rainforest cover (Fig. 1), while only 6% is cultivated area which supports 3.79 lakhs settled and around 2.0 lakhs floating population. Out of 2500 angiospermous species reported so far known from these islands about 200 are endemic and 1300 do not occur in mainland India. Around 52 species are being used as source of food and medicine by the primitive tribes (Balakrishnan & Ellis, 1996). The coastal area of islands has rich diversity of mangroves, algae and microbes. Around 300 species of medicinal plants have been reported in islands which act as source of medicine in traditional medicinal system of islands. The *Morinda* (*Morinda citrifolia* L.; Rubiaceae) a native plant of Islands is being used in traditional health system of Nicobarese has got potential in modern herbal industry. Similarly, more than 14 plants are recognized as potential medicinal plant in islands. In faunal diversity, about 50 species of forest mammals are found in islands. Rat (26 species), bat (14 species), wild pig (2), spotted deer (3), feral elephants etc. are predominant. The islands harbour about 225 species of butterflies and moths including 10 endemic species. It makes these islands as the house for some of the large and most spectacular butterflies of the world.



Fig. 1: Andamans: sea, forest and human settlement

The Mount Harriet National Park is one of the richest areas of butterfly and moth diversity in these islands. Besides, the islands have rich diversity of birds, fish, corals, reptiles, lizards, frogs and microbes.

Islands Cultural Diversity

The primitive tribes of Andaman Islands namely Great Andamanese, the Onges, the Jarawas and the Sentinels are short in stature, dark skin colour with peppercorn hair and identify themselves as Negrito (a sub-group of negriod people) but quite distinct from the African Tribes. Each of this tribe has a different dialect and conventional territories or division. However, when these tribes did come to the islands, in general or how other Negrito tribes populated the Andamans in particular, cannot be said with certainty due to the absence of conclusive paleontological evidences (Majumdar, 1975). While the Nicobarese and the Shompens tribes of Nicobar group of Islands are mongoloids and have yellowish brown complexion, flat nose, broad lips with epicanthic fold in eyes and straight type of hair. Among these tribes, only the Nicobarese have natural population growth (28,653) made headway on the road to civilization. The population of other tribes is very less as Shompen (400), Jarawa (341), Onges (96), Great Andamanese (43) and Sentinelese (39). They have differences in language, culture and living habit, food and

food habits etc. But, they all highly respect nature's gift in the form of biodiversity of flora and fauna. They collect their food and other items from the rich forests and sea which acts as home for a number of sources. Culturally the islands or 'Min-India' represents most of India's cultural diversity in true sense. This is due to harmonious living of settlers from different cultural groups like Bengali, Tamil, Telugu, Malayali, Marathi, Hindi, Ranchi, Kannada, Punjabi, Rajasthani etc. and different religions. The families having members with different religious faiths are also found in these islands.

Island Biodiversity as Food Resource and Nutrition

The food habits and food sources travels with human population which also happened in these islands during the settlement process. During preliminary surveys many of the food resources in islands are brought from outside. It may be cereals, pulses, vegetables, fruits, livestock, some of the fishes etc. though some of them took lot of time to adapt in tropical humid climate. But island biodiversity also contributed a lot through providing alternative resources for vegetables, fruits and animal protein (Fig. 2). Many of the native plants which are not known in mainland are used as source of delicious vegetables and desserts. The nutritional profiling of some of the native fruits and vegetables indicated their richness in dietary elements particularly micronutrients which are deficient in most of the daily diet of vulnerable societies. These resources are comparatively better in iron, calcium, zinc, copper and selenium than most present day food plants (Singh *et al.*, 2011). They contribute in proper nutrition of primitive tribes and settler communities in islands.



Fig. 2: Native agro-biodiversity in Sunday market, Junglighat (Port Blair)

On one side the islands are rich centres of floral and faunal biodiversity but on other side they have large pool of undernourished children and women. The Andaman and Nicobar Islands are typical tropical island ecosystem where limited land resources are catering the needs of local and tourist population. The investigation particularly amongst tribals of nigrilo origin indicate that indigenous tribes are deficient in iron, calcium, beta-carotene and vitamin C (Rao *et al.*, 2006). The efforts through highlighting the nutritional potential of native underutilized fruits, vegetables, fishes and poultry are changing the perceptions of people about these neglected resources increasing their share in local markets (Fig. 2). However, the promotion of these traditional food resources in the habitats and homegardens of indigenous tribes of islands through training and sensitization approaches are producing desirable results.

Islands' Agri-Biodiversity

The surveys made by research institutes identified islands as hotspot of landraces of many commercial crops (Abraham *et al.*, 2008). Islands have rich diversity of tuber crops, vegetables, fruits and their local germplasm resulting in development of varieties in various agricultural crops. Further, the Central Island Agricultural Research Institute (CIARI), Port Blair has developed varieties in different crops using local germplasm for the benefit of farmers (Sankaran *et al.*, 2012). These improved genotypes are well adaptive and high yielding and more accepted among local people. The local crops, animal and fisheries components gave full chance to integrate to resilience level to strengthen the mitigation strategy in agriculture sector against climate change. The CIARI has developed three different integrated farming system models for upland, medium land and low lands with suitable components. These models also proved profitable and adopted by many of local farmers as livelihood

option in post Tsunami period. This also showed efficient use of farm resources in sustainable manner. The vegetables are mostly cultivated in uplands during rainy season while low lands were under rice or fallow (Singh *et al.*, 2014). The high price of vegetable and flower during this season attracted researchers and farmer to develop broad bed and furrow system and raised bed technologies for diversification of land use pattern. The CIARI also developed multi-storey cropping system for tropical island conditions for increasing carbon sequestration, efficient utilization of sun light and water resources and risk mitigation in farming.

Climate Resilient Varieties from Local Biodiversity

The tropical islands are rich in floral diversity but identification of donor sources for climate resilient traits is a big challenge for breeders. The genes involved in determining yield and adaptation potential and their importance and expression patterns vary widely depending on the crop and growing environment. Even so, genes that directly affect yield and adaptation are being identified in different agricultural crops in islands. The marker-assisted breeding (MAB) has clear advantages over conventional breeding practices regarding rates of gain of crop yield and associated traits. This MAB approach is useful for aggressive breeding programs which reduce time and cost of trait identification and breeding of new varieties for adverse climatic conditions.

Tourists and Island Biodiversity

Tourism is the largest service industry in India with a contribution of 6.23% to the national gross domestic product (GDP) and 8.7% of total employment in India. The tourism industry in India generated about US \$ 100 billion in 2008 and that is expected to increase to US \$ 275.5 billion by 2018 at a 9.4% annual growth rate. Similarly, the tourism is important source of income in islands and during 2011-12 around 2.5 lakhs tourist arrived in islands (Chand *et al.*, 2013). The CIARI with line department promoting the protected cultivation of high value vegetables and flowers for island conditions which is showing positive impact in some localities. This will cater to the needs of tourism sector by local production and reducing the money flow from island economy and give opportunity to spend money in islands.

Island Biodiversity Conservation Issues

Though it is difficult to project the exact loss of biodiversity due to human interventions but of course, the degradation of habitats and rate of extinction of species have been increased than natural pattern. The main threats to the island biodiversity are invasive alien species, climate change, nutrient loading and pollution, habitat change and overexploitation. Unless we successfully mitigate the impacts of these 'divers of change' the loss of biodiversity will continue. The invasive alien species and their associated practices are causing major threat to the island biodiversity. More than 100,000 islands on earth support 20% of global biodiversity but their fragile and vulnerable ecosystems have recorded around 80% of known species extinctions and currently 45% of IUCN Red List endangered species occur on islands (<http://www.iucn.org/>). Some of the researchers claim that 50 to 67 percent of extinctions of terrestrial species on islands have been caused by the impacts of invasive species (http://www.iucn.org). Thus, the planners should take a note for the conservation of precious floral and faunal diversity. Climate change may shift the distribution of biogeographic zones where sea water may inundate the coastal areas where plants and animals may not be able to thrive. The climate change will certainly affect the reproductive stages and pest tolerance levels of species which will contribute in extinction of species. The forest degradation and addition of chemicals for agriculture may act as an "eco-cide" for islands biodiversity. In islands, the development interventions should be sustainable and nature conscious so that the nature and availability of basic life resources of the primitive tribes should not be affected. The human-nature relationship, origin of biodiversity related problems and their solution need to be considered in a holistic manner with adequate efforts for conservation and utilization of biodiversity in islands.

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