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Bio-wealth, biocleansing and anthropogenic activities on the two urban beaches of Trivandrum: Shankumugham & Veli

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ABSTRACT

Urban beaches play prime roles for the recreation of urban rush and hectic life as well as in the ecological balance. They provide livelihood to the locals and are home of diverse flora and fauna. In the present study, two urban beaches of Trivandrum, Kerala were selected for the pilot study on the flora, fauna and anthropogenic activities. A survey was carried out for the documentation from

November 2016 to April 2017. Results revealed that the areas are home of 41 major plant species and 11 avifaunal species. Beach biocleansing agents were studied and their role in the beach ecology was documented. The visible man made activities were noted and found that plastics are the major problem on both beaches. The present study highlights the importance of urban beaches and tried to bring attention on the anthropogenic activities. The survey recommended that there is urgent need to clean these urban beaches to check the negative impacts on ecological balance and for sustainable living.

Kew-words: Shankhamugam, Veli, Beach ecology, Ghost crab, Sand dune flora, Avifauna, Anthropogenic activities

1. INTRODUCTION

Sea beaches are the place of recreation for the human beings since long. They are the place of fishing communities and their traditional skills. Beaches provide livelihood in many ways. In modern era, most of the beaches are affected with urbanization due to development of cities, tourism and the hotel industries. Though tourism is good for the local economy but it destroys the sea beach ecology. India is covered with about 7516.6 Km of coastline having about 110 beaches. Among them Kerala enjoys about 21 beaches / sand. Among the sea beaches of Kerala, Trivandrum has about 3 beaches and about 35 Km length of coastline. Shankumugham and Veli are two prominent beaches close to Trivandrum city (Baba 1988; Purandara and Dora 1989; Kumar et al. 2006; SER 2007). They are famous tourist destinations. They are the home of urban fishing community. Shankumugham beach (SB) is very close to Trivandrum International Airport having a beautiful sunset view. It is situated between 8.48112950°N and 76.91237030°E (Valson and Soman 2015). It is culturally very important and considered as the "Arattukadavu" of Sri Ananthapadmanabhan. The Hindus perform "Bali Tharpanam" here. On the "Arattu day", images of Lord Padmanabhawamy, Narasimha and Krishna are taken for the ceremonial bath in SB. Veli beach (VB) is very close to SB and about 10 km from the city. It is associated with Veli Lake and Veli tourist village, which make the beach a great recreation point in the urban environment. SB and VB both enjoy the charm of diverse bio-resources even they are very close to the urban area (Mahanti and Kumar 2017). Both places are good for watching the bird diversity and to study the sand dune flora. They provide a sound platform for the beach ecological studies, impacts of anthropogenic activities and the problems due to climate change. There are very few or no scientific studies are available on the available bio-resources, biocleansing agents of beach and the magnitude & impacts of visible anthropogenic activities. Hence keeping this in view, an attempt has been made to document the bio-wealth, natural biocleansing agents and visible anthropogenic activities on SB and VB. The present study highlights the importance of these two urban beaches and how anthropogenic activities are destroying the serene and quality of SB and VB which are common property resources and hence need to be preserved for posterity.

2. METHODOLOGY

The field survey was carried out from November 2016 to April 2017. The major flora on sand bar and avifauna are enumerated. The feeding behaviors of Ghost crab as a biocleansing agent on both the study beaches are documented in day time (11 AM to 4 PM). The major visible anthropogenic activities by the fishing communities and urban people / tourists are noted down and photographed.

3. RESULTS & DISCUSSION

The survey revealed that both the urban beaches are rich with flora and avifauna. About 41 plant species and 11 avifauna are noted. The major plant species are *Acalypha indica, Canavalia rosea* (Plate 1.1), *Casuarina angustifulia, Ipomoea biloba* (Plate 1.2), *Mollugo pentaphylla, Sida acuta, Hemidesmus indicus* etc. Details are listed in Table 1. Among the documented avifauna, the most common are *Bubulcus ibis* (Plate 2.2), *Corvus splendens* (Plate 2.2), *Egretta gularis* and *Haliastur indus* (Plate 4.4). It was observed that *Chlidonias hybrida* are seen on sea beach about 4 PM to 6 PM. They are found hovering on the shore line close to the beach, on the sea. Cormorants are also seen at both beaches in air at about 5 PM to 6 PM perhaps returning to their perch. As they make their return flights, they make different formations and the spectacle of the patterns in the backdrop of the setting sun mesmerizes the visitors on the beach.

Table 1 Sand dune flora, beach side plants and avifauna of SB & VB, Trivandrum

Floral Diversity	
Botanical Name	**Categories**
Acalypha indica	Herb
Ageratum conoyzoides	Herb
Alstonia scholaris	Tree
Alternathera sessilis	Herb
Biophytum sensitivum	Herb
Boerhaavia diffusa	Herb
Calotropis gigantea	Shrub
Canavalia rosea	Climber
Casuarina angustifolia	Tree
Cayratia trifolia	Climber
Centella asiatica	Herb
Cleome viscosa	Herb
Coccinia grandis	Climber
Coccus nucifera	Tree
Crotalaria verrucosa	Herb
Croton bonplandianum	Herb
Eclipta alba	Herb
Elephantopus scaber	Herb
Emilia sonchifolia	Herb
Evolvulus alsinoides	Prostrate
Grewia asiatica	Shrub
Hemidesmus indicus	Climber
Ipomoea biloba	Climber
Justicia diffusa	Herb
Lantana camara	Shrub
Leucaena leucocephala	Tree
Ludwigia adscendens	Herb
Mimosa pudica	Herb
Mollugo pentaphylla	Herb
Pandanus utilis	Shrub
Passiflora foetida	Climber
Scoparia dulcis	Herb
Sida acuta	Herb
Sida cordifolia	Herb
Sida rhombifolia	Herb

Stachytarpheta jamaicensis	Herb
Terminalia catappa	Tree
Thespesia populnea	Tree
Triumfetta pentandra	Shrub
Wedelia chinensis	Herb
Asystasia gangetica	Herb
Derris trifoliata	Climber

Avifaunal Diversity	
Common name	**Scientific Name**
Black kite	*Milvus migrans*
Brahminy Kite	*Haliastur indus*
Cattle egret	*Bubulcus ibis*
Common myna	*Acridotheres tristis*
Common Crow	*Corvus splendens*
Common sandpiper	*Actitis hypoleucos* (Plate 4.2)
Gray heron	*Ardea cinerea*
Great egret	*Ardea alba*
Kentish plover	*Charadrius alexandrines* (Plate 4.3)
Western reef heron	*Egretta gularis* (Plate 4.4)
Whiskered tern	*Chlidonias hybrida*
Rock pigeon	*Columba livia*

During the survey, it was noted that *Bubulcus ibis, Corvus splendens, Egretta gularis* and Ghost crab (*Ocypode brevicornis*) (Plate 2.3) were responsible for the biocleansing of the beach by feeding on the dead fish species that were thrown on the beach by the tides (Plate 2).

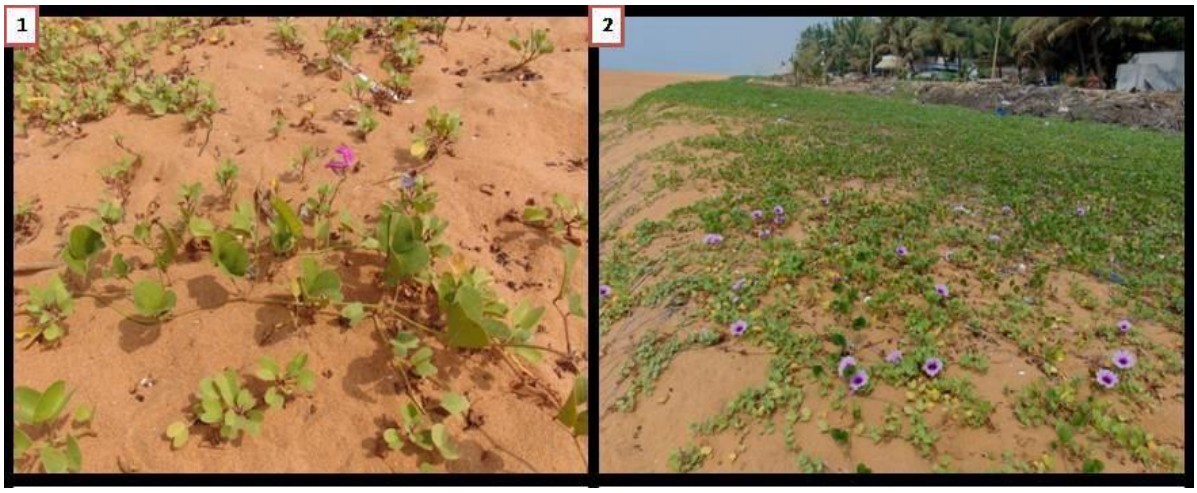

Plate 1 Sand dune flora at study area; 1: *Canavalia rosea,* 2: *Ipomoea biloba*

Plate 2 Biocleasing agents at study area; 1: *Corvus splendens,* 2: *Bubulcus ibis,* 3: *Ocypode brevicornis*

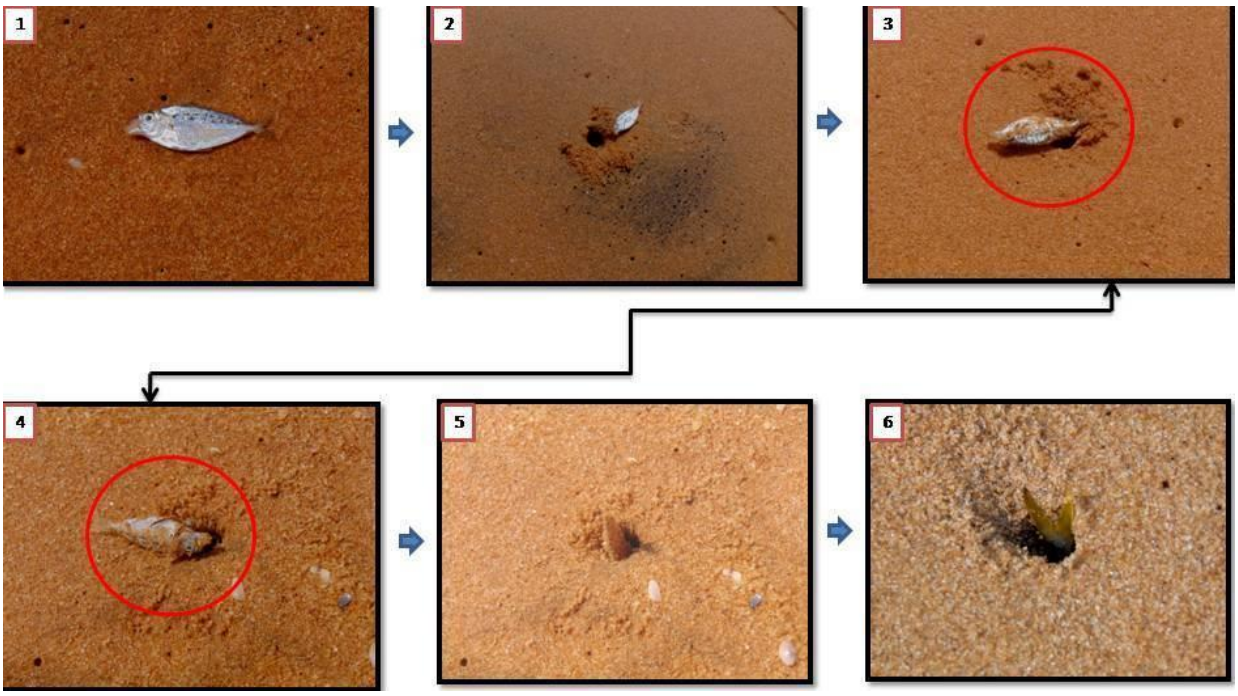

Plate 3 The feeding behavior of Ghost crab (*Ocypode brevicornis*) as biocleasing agent at Shankhamugam beach, Trivandrum

The food habits of *Ocypode brevicornis* was observed during the study and a beautiful documentation was done which reflects its quality as a natural cleaning agent which maintains the quality of the beaches. It was noted that the study area is affected with anthropogenic activities. The major threats, manmade activities and impacts are listed in Table 2-3 and Plate-5.

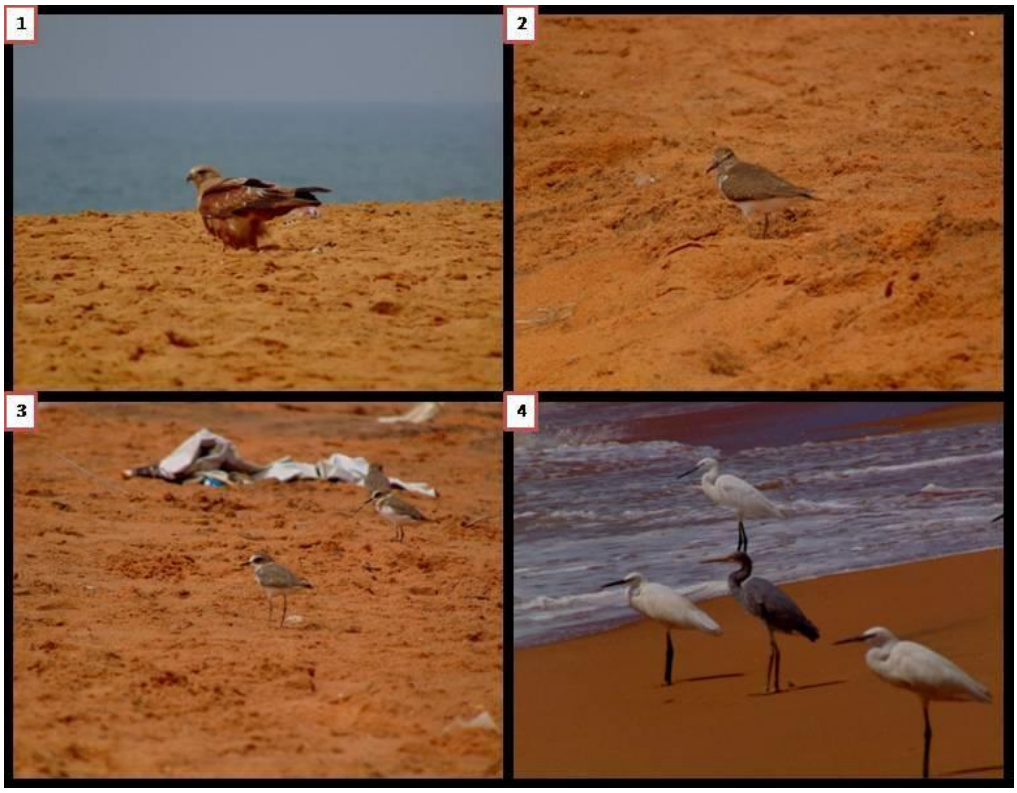

Plate 4 Avifaunal diversity at SB and VB; 1**:** *Haliastur indus,* 2: *Actitis hypoleucos,* 3: *Charadrius alexandrines,* 4: *Egretta gularis* among *Bubulcus ibis*

It was noted that, the *O.brevicornis* on seeing the dead fish on the beach, comes near the fish and drags the fish to its hole mostly from the head side. Very slowly dragging the fish to the hole, it first expends the entrance of the hole by digging out the sand to accommodate the fish. Then it enters the hole first, sticks out its claws and legs, grabs the fish from the head end and pulls it down into the hole (Plate 3). This chain of activities conducted by the *O.brevicornis* as a part of its feeding habit, contributes to the natural cleansing of the beach.

Table 2 Major anthropogenic activities / threats at SB & VB

Factor(s)	Source / Category
Plastic bottles	Non-degradable
Polythene bags	Non-degradable
Drain	Urbanization
Food Packets	Local shops
Coconut husk	Local shops
Wine & Beer Can (tin)	Non-degradable
Wine & Beer bottles (glass)	Non-degradable
Waste from local habitants (Fishing communities)	Degradable & Non-degradable
Used fishing nets	Local habitants / Fishing Communities
Dead domestic animals	Local communities
Dead fish and other fauna	Degradable

Plate 5 Anthropogenic activities at study area; 1: wastes at VB, 2: a lady from the fishing community putting waste directly to sea, 3: at SB, 4: at SB

Table 3 Impacts of anthropogenic activities

Anthropogenic stuffs	Impacts
Plastic bottles	Toxic
Polythene bags	Toxic
Drain	Destroys the beach ecology and is a cause for the death of sea shore fauna
Food Packets	Toxic
Coconut husk	Pollution after degrading
Wine & Beer Cane	Anti-social
Wine & Beer bottles	Anti-social
Waste from local habitants (Fishing communities)	Toxic for sand dune flora and fauna
Dead animals	Air pollution and toxic for the sand dune flora & fauna and carriers of pathogens

Plate 6 Livelihood at SB and collecting a faunal species for medicine and food by local fishing community at SB

During the survey, it was observed that the both the studied beaches are intrinsically linked with the life and livelihood of the local communities (Plate 6). Authors also have reported the bio-wealth of Poovar beach and Velli Lake (Mahanti and Kumar 2017a; Mahanti and Kumar 2017b) and tried to bring attention on the importance of Wetland and Sea beaches.

4. RECOMMENDATION

The present study suggests the following activities for the sustainability of these urban beaches:

1. Periodic removal of plastic bags, plastic food packets, plastic bottles, bottles of beer & wine and other harmful stuffs from both the beaches.
2. Ban of all non-degradable substances on beaches of SB & VB or put maximum number of dust bin in a standard distance on both beaches.
3. Check all effluents, wastes and wastes from the local fishing communities.
4. Beach guards are needed to check the breaking of rule in using non-biodegradable substances and should ban drinking on both the beaches.
5. Trainings on sustainable management of the beach areas should be provided to the local fishing communities.
6. Signages and awareness materials to be displayed around the beach areas of SB & VB.

7. Plastic management rules and regulations to be strictly enforced in the SB & VB.
8. Possibilities of having a coastal bioshield need to be explored in the stretches between SB and VB.

5. CONCLUSION

The present study concluded that both the beaches are important for the recreation of urban Trivandrum. The maintenance of the studied beaches is essential for long term conservation of their resources and balancing the beach ecology along with preserving the aesthetics of these pristine landscapes which is a common property resource and hence needs to be protected.

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