Journal of Asia-Pacific Biodiversity 9 (2016) 11–16

HOSTED BY

Contents lists available at ScienceDirect

Journal of Asia-Pacific Biodiversity

journal homepage: http://www.elsevier.com/locate/japb

Original article

Diversity and distribution of fauna of the Nasese Shore, Suva, Fiji Islands with reference to existing threats to the biota

Dissanayake Mudiyanselage Suratissa [a,b,*], Upaka Sanjeewa Rathnayake [c]

[a] Fiji National University, Suva, Fiji
[b] Department of Zoology, University of Colombo, Columbo, Sri Lanka
[c] Sri Lanka Institute of Information Technology, Malabe, Sri Lanka

ARTICLE INFO

Article history:
Received 7 May 2015
Received in revised form
18 November 2015
Accepted 16 December 2015
Available online 24 December 2015

Keywords:
belt transect method
biota
faunal diversity
Nasese Shore
Shanon–Weiner index

ABSTRACT

Faunal diversity and distribution in the Nasese Shore, Suva, Fiji Islands were studied April–August 2014. The belt transect method was employed to study the species richness and abundance of the fauna. Opportunistic observations were performed to supplement the species richness of the selected habitat types: sandy, rocky and muddy (SRM; Habitat 1); mangrove and sandy (MNS; Habitat 2); muddy and sandy (MS; Habitat 3); and rocky and coral (RC; Habitat 4). Sampling was performed during high and low tide. Faunal density was highest in the RC substrate. The density of mud skippers was significantly higher in the MNS habitat than in the other habitats. This findings could well indicate the environmental pollution levels of this habitat. The Shanon–Weiner Index indicated that the RC habitat possesses the highest diversity, whereas the MS habitat possesses the lowest diversity. In addition, major threats to the biota existed.

Introduction

The Fiji Islands comprise 1,130 km of a coastline and covers approximately 31,000 km^2 of coastal and inland waters. These waters are still in pristine condition. However, this prestigious coastal environment is threatened by ever increasing urbanization and demand for consumptive uses by the population. Expanding tourism and the agricultural, forestry and fisheries industries, coupled with increasing rates of urbanization within a legal and institutional framework with limited environmental considerations, suggests that serious steps need to be taken at the national level to safeguard the country's coastal ecological system. These growing issues can be understood by analyzing the population density in Fiji Islands. An estimated 76% of people of Fiji live within 30 km of the surrounding reefs (Burke et al 2011). Thus, the baseline data on the marine biota of Fijian coastal wetlands are mandatory to consider their proper management.

Marine biodiversity is higher in the benthic zone, compared to pelagic systems. In addition, the near shore environment is richer in biodiversity, compared to the sea (Gray 1997). However, damage to this biodiversity is higher because of conflicting usages. Bivalve mollusks levels (by species, genus, and family) nevertheless have increased diversity towards the tropics in the Indo-Pacific region (Stehli and Wells 1971; Etter and Grassle 1992). This phenomenon does not occur in other species. In addition, the diversity of seaweed (i.e. macroalgae) is higher in temperate latitudes than in the tropics, and diversity is lowest at the poles (Silva 1992).

Most threats to biodiversity in the coastal zone are a direct result of human population and demographic trends. Habitat loss and deterioration, global climate change, and overexploitation of various aquatic living species are a few of the major identified issues in coastal zones (Lundin and Linden 1993; Fluharty 1994; Norse 1994; Sebens 1994; Suchanek 1994). The damage is enhanced because of the lack of awareness among various stakeholders. These threats are frequently interlinked. Biodiversity is further in danger because of the rapid loss of coral reefs. Sedimentation, overexploitation of various aquatic living species, and chemical fishing are a few of the major reasons for the rapid loss of coral reefs (Gray 1997).

Solid waste dumping in the coastal environment is another big threat to coastal biodiversity. Solid waste from industries and households, and solid waste from the coastal environment (e.g. tourism, shipping, and fishing industries) impose great damage

* Corresponding author. Tel.: +94 783626596.
E-mail address: suratissa.mudiyan@fnu.ac.fj (D.M. Suratissa).
Peer review under responsibility of National Science Museum of Korea (NSMK) and Korea National Arboretum (KNA).

http://dx.doi.org/10.1016/j.japb.2015.12.002

(Naidu et al 1991). It is interesting that approximately 75% of solid waste is from nonbiodegradable plastic, polystyrene foam, metal, glass and timber. Turtles can be severely affected by these types of solid waste (Naidu et al 1991).

Because there is a serious dearth of knowledge and quantitative data on such biotic resources in intertidal areas of Fiji Islands, this paper targets to quantify the abundance, density, and distribution of selected marine biota. This will help in the management of coastal resources in the future. Therefore, the main objective of the research was to determine the distribution, abundance, and density of fauna of selected habitats of the intertidal area of Nasese Shore, Suva, Fiji.

Materials and methods

Study area

Suva, the capital of Fiji Islands, consists of intertidal wetlands and is rich in biodiversity. It is an economically important region for the whole South Pacific. The study site, Nasese Shore, is in downtown Suva and lies towards the southeastern side of the city (Figure 1). Baseline information of the coast is needed for the sustainable management of coastal resources in this Nasese area.

Field study and analysis

Faunal diversity and distribution of the Nasese Shore, Suva, Fiji Islands were studied April–August 2014. This study was conducted during the cooler (i.e. rainy) season of Suva, Fiji Islands; the annual rainfall is usually 3000 mm. The belt transect method was employed to study the species richness and abundance of fauna (Anderson and Pospahala 1970; Sutherland 2006). Three belt transects of 5-m fixed width and 300-m length were laid in a stratified random design for each habitat type. Opportunistic observations were performed to supplement the species richness of the selected habitat types. For instance, Fishermen's catches were examined to study the species of fish inhabiting the habitats. Habitat types were categorized, based on the substrate quality: sandy-rocky-muddy (SRM; Habitat 1); mangrove-sandy (MNS; Habitat 2); muddy-sandy (MS; Habitat 3); and rocky-coral (RC; Habitat 4). Sampling was performed during high and low tide periods April–August 2014.

All four habitats experienced a similar tidal influence. However, the impact of inland water intrusion was not the same in all habitats. A stratified random sampling design was used to place the belt transects in the intertidal zone. Figure 1 shows the sampling sites. The Shanon–Weiner Diversity Index was calculated to express the faunal diversity of each habitat. The Kruskal–Wallis test was employed to compare the abundance and density of different faunal groups in the four habitat types. Opportunistic data were used only to express the species richness and to construct the inventory of species for each habitat.

Results

Faunal diversity

During the study period, 300 belt transects were examined in the four selected habitats of the intertidal area of the Nasese Shore.

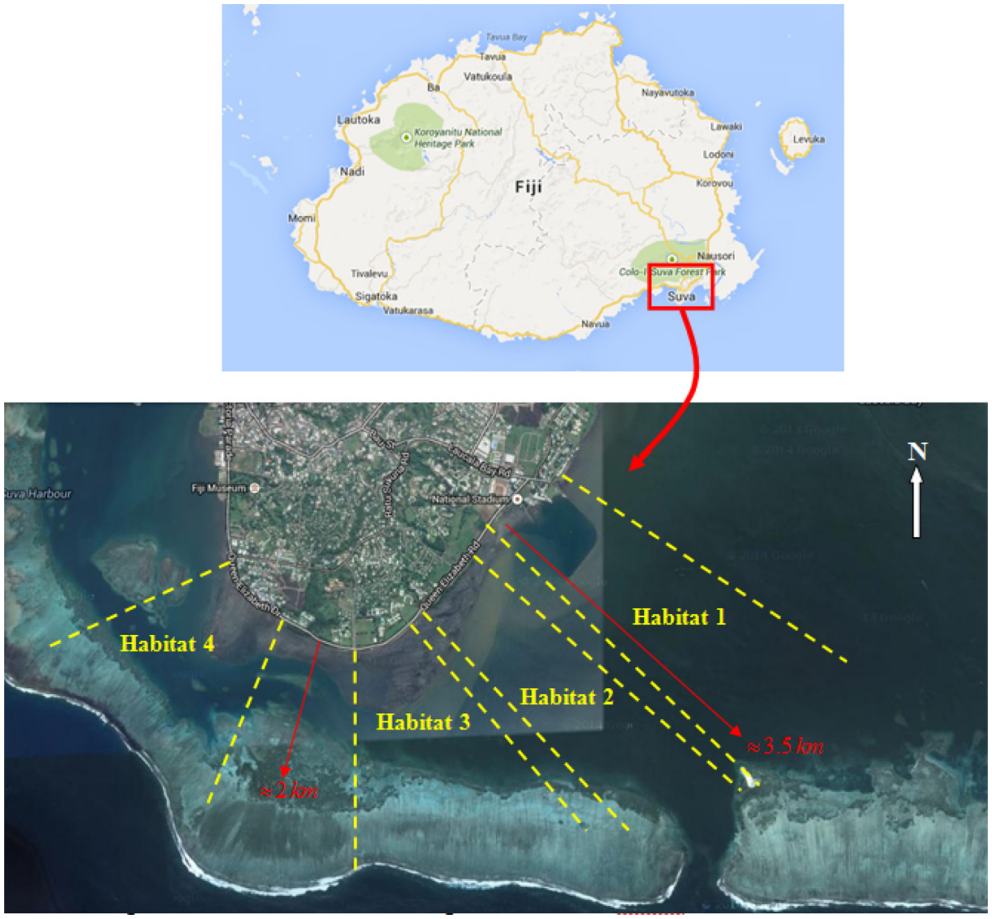

Figure 1. Study sites at Nasese Shore, Suva, Fiji.