



Contents lists available at ScienceDirect

Regional Studies in Marine Science

journal homepage: www.elsevier.com/locate/rsma

Effects of hydrographic conditions of ponds on juvenile fish assemblages in the Kakum mangrove system, Ghana



Evan S. Levy^a, Noble K. Asare^{b,*}, Kobina Yankson^b, Daniel A. Wubah^c

^a Department of Organismal Biology and Ecology, Colorado College, Colorado Springs, CO, USA

^b Department of Fisheries and Aquatic Sciences, University of Cape Coast, Ghana

^c Office of the Provost, Washington and Lee University, VA, USA

HIGHLIGHTS

- Role of hydrographic conditions in the use of mangrove ponds as fish nursery assessed.
- Pond selectivity by juvenile fishes largely influenced by salinity and pond size.
- Smaller juveniles preferred lower salinity conditions and shallower ponds.
- Diversity and abundance of fish higher in ponds closer to the estuary.
- Three fish species out of 18 better adapted to changing hydrographic conditions.

ARTICLE INFO

Article history:

Received 14 June 2015

Received in revised form

2 August 2015

Accepted 4 August 2015

Available online 7 August 2015

Keywords:

Juvenile fishes

Nursery ground

Mangrove tidal ponds

Hydrographic conditions

ABSTRACT

The importance of mangrove ecosystems as nursery grounds for fishes is well established and documented. This paper reports on the possible role of hydrographic dynamics in the selection and utilization of tropical mangrove ponds as nursery habitats for juvenile fishes of ecological and commercial importance. The study was conducted in the Kakum River Estuary mangrove ecosystem near Elmina in the Central Region of Ghana during the peak of the monsoon season. Fish assemblages were sampled using a cast net and a pole seine. Aspects of hydrographic conditions of the ponds were studied. A total of 265 fish specimens, belonging to 18 species and 12 families were sampled. The commonest fish was the blackchinned tilapia *Sarotherodon melanotheron*, a typical brackish water fish in West Africa, which accounted for 66.4% of the total fish sampled. Ten of the 18 species belonging to 7 families, namely *Elops lacerta*, *Eucinostomus melanopterus*, *Porogobius schlegelii*, *Gobionellus occidentalis*, *Mugil bananensis*, *Liza falcipinnis*, *Epinephelus* sp., *Serranus accraensis*, *Penaeus notialis* and *Callinectes amnicola* were of marine origin. Spatial and temporal variations in the prevailing hydrographic conditions appeared to influence the fish species composition, density and size classes to varying degrees. Changes in salinity, dissolved oxygen, pH, conductivity and pond size correlated significantly with abundance of juvenile fish. Major fluctuations in fish species composition occurred on a weekly basis with changing pond depth and volume, indicating the dynamic nature of mangroves ponds that may serve the ecological needs of different species over time. Smaller juvenile fishes seemed better adapted to high variations in hydrographic conditions compared to larger juveniles. Higher fish densities and lower species diversity were encountered when the ponds were shallow compared to deep ponds. The utilization of mangrove tidal ponds as nurseries by juvenile fish may therefore be influenced primarily by the salinity and pond size.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

Human growth and development has caused the degradation and/or disappearance of many mangrove ecosystems worldwide.

In the last half century, more than a third of the world's mangroves have been lost (Alongi, 2002) at a considerably high rate of 1%–2% per annum (Di Nitto et al., 2014). With the continued threat of sea level rise from climate change, increased deforestation and pollution due to burgeoning human populations in the tropics, the health of mangrove ecosystems face an uncertain future (McLeod and Salm, 2006).

Mangrove ecosystems provide essential ecological services such as nursery habitat for a host of ecologically and commercially

* Corresponding author.

E-mail address: nasare@ucc.edu.gh (N.K. Asare).