

Impact of climate change variability on abundance of crab in Pangani estuary

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Abstract

This research proposal focuses on the impact of climate change on abundance of mud crab (*Scylla serrata*) in the wild stock. Crab farming is practiced by collecting seeds from the wild and then shorten their growth period by fattening. Mud crabs are highly valued for their size, high meat yield and the delicate flavor of their flesh. Climate change is anticipated to alter some conditions in marine habitat and affect the growth performance of water organisms including mud crab. The associations between mud crab population and climate change have not yet been described along the Tanzanian coast. Lack of accurate and precise information of the mud crab abundance and its distribution signifies the need for further research. Results of the study will guide the development of sustainable methods of exploiting this marine resource.

Key words: Abundance, climate change, distribution, *Scylla serrata*, variability

Résumé

Ce projet de recherche se concentre sur l'impact du changement climatique sur l'abondance du crabe de boue (*Scylla serrata*) dans le stock sauvage. L'élevage des crabes est pratiqué par la collecte des semences dans la nature, puis on raccourcit leur période de croissance par l'engraissement. Les crabes de boue sont très appréciés pour leur taille, le haut rendement en viande et la saveur délicate de leur chair. Le changement climatique est prévu de modifier certaines conditions de l'habitat marin et d'affecter les performances de croissance des organismes aquatiques, y compris du crabe de boue. Les associations entre la population de crabes de boue et le changement climatique n'ont pas encore été décrites le long de la côte tanzanienne. Le manque d'information exacte et précise de l'abondance des crabes de boue et de leur distribution signifie la nécessité de poursuivre les recherches. Les résultats de l'étude orienteront le développement de méthodes durables d'exploitation de cette ressource marine.

Mots clés: abondance, changement climatique, distribution, *Scylla serrata*, variabilité

Background

The mud crab (*Scylla serrata*) is a big portunid crab that lives on soft muddy bottoms, often associated with mangroves, in the Indo-West Pacific (FAO, 2010). It is fished and cultured across its area of distribution. Mud crab farmers collect juvenile crabs from the mangrove ecosystem as seed and use them to raise the insects. This activity has potential to develop into an important alternative income for resource poor coastal communities in East Africa. Mud crab farming is done mainly by fattening. It is likely that mud crab populations will experience increased fishing pressure, targeting all size-classes, from large juveniles for cage culture to mature for premium markets. This is practiced by collecting large juveniles or small adults and culturing them for a shorter period of time until they attain commercial size. The high commercial prices commanded by mud crab and the ease with which it is captured leads to its over exploitation (Le Vay, 2001). Despite the high fishery potential of crabs in Tanzania, there is no enough information on its fishery status (Chande and Mgaya, 2003). Lack of accurate and precise information of the mud crab abundance and its distribution signifies the need for further research and better understanding. Therefore, this study will fill the knowledge gap on the impact of climate change variability on the abundance of mud crab in Pangani estuary Tanzania. Results of the study will guide its sustainable exploitation as the estuary is the only source of mud crab seed.

Literature Summary

The impact of climate change is expected to affect the marine fishery habitat, including mud crab which normally inhabit tropical to sub-tropical mangrove forest ecosystems. Mangroves act as a nursery and breeding habitat for marine species such as fish, crabs and prawns, but sea level rise is now considered a major threat to mangroves (Hobday *et al.*, 2006). Currently, there are changes in marine and freshwater biological systems, and these are associated with rising water temperatures, as well as related changes in ice cover, salinity, oxygen level and circulation. These changes are also affecting algal and plankton populations (IPCC, 2001). Understanding the impact of climate change on the fishery resources is necessary for the development of cost-effective management of fisheries resources. Among the most effective strategy to mitigate the impacts of climate change on fishery resources can be to ensure that wild stocks and the habitats in which they depend are preserved and protected.

Study Description

This study will be conducted at Pangani estuary, in Tanga, Tanzania. The study area will be mapped using a hand-held

	<p>GPS. Eight basket traps will be used; four will be set in deeper water and four in shallow water. The traps will be baited with fish offal and left overnight and hauled the following morning. Climate change factors such as Temperature, dissolved oxygen, pH and salinity will be measured concomitantly with mud crab sampling. The abundance of mud crab wild stock will be estimated using Catch per Unit Effort (CPUE) and will be analysed using parametric tests, Analysis of Variance (ANOVA) or its equivalent non-parametric test Kruskal Wallis. The relationship between the abundance of wild stock of mud crabs and climate change factors will be analysed using correlation.</p>
Research Application	<p>The results of the study will establish factors related to climate variability that affect populations of mud crab in the estuary. Knowledge of these factors is key for developing sustainable measure to exploit this water resource.</p>
Acknowledgement	<p>The authors express gratitude to RUFORUM for financial support through the Graduate Research Grants.</p>
References	<p>Chande, A.I. and Mgaya, Y.D. 2003. The fishery of <i>Portunatus pelagicus</i> and species diversity of portunid crabs along the Coast of Dar es Salaam, Tanzania. <i>Western Indian Ocean Journal of Marine Science</i> 2:75-79.</p> <p>FAO. 2010. Species Fact Sheets – <i>Scylla Serrata</i>. Food and agricultural organization of the United Nations (FAO) Fisheries and Aquaculture Department. http://www.fao.org/fishery/species/2637/ site visited on 12/04/2012.</p> <p>Hobday, A.J., Okey, T.A., Poloczanska, E.S., Kunz, T.J. and Richardson, A.J. 2006. Impacts of climate change on Australian marine life: Part A. Executive Summary. Report to the Australian Greenhouse Office, Canberra, Australia. September 2006.</p> <p>IPCC. 2001. Intergovernmental Panel on Climate Change. Summary for policymakers. A Report of Working Group 1 of the Intergovernmental Panel on Climate Change, pp. 1-20. R. T. Watson, ed. Cambridge: Cambridge University Press.</p> <p>Le Vay, L. 2001. Ecology and management of mud crabs, <i>Scylla</i> spp. <i>Asian Fisheries Science</i> 14:101-111.</p>