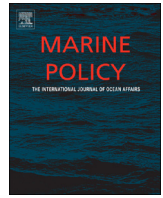




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Catch trends in Philippine small-scale fisheries over the last five decades: The fishers' perspectives



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ABSTRACT

Understanding catch trends through time is a crucial management consideration that would ensure long term sustainability of the fisheries. This study describes some changes in small-scale fisheries in the Philippines over the past five decades using both "quantitative" and "qualitative" estimates of current and past daily catches. "Quantitative" estimate was determined as the difference between current and past catches in kg per trip, as reported by fishers, on a normal fishing day. "Qualitative" estimate, on the other hand, was determined by asking fishers whether current catches are (i) less than half, (ii) lower to 50%, or (iii) the same or higher than past levels. "Quantitative estimate" indicated that current catches are lower by $16 \pm 14\%$ of the 2000–2010 levels and 24 ± 13 – $26 \pm 19\%$ of catch levels in the preceding four decades. Catch decline over the past five decades was much worse based on "qualitative" estimate. The relatively more stable catches from "quantitative" estimate could be attributed to the improvement in fishing strategies employed by fishers to keep catches high even as the fish stocks continue to decline. The results of the study further suggest that the condition of small-scale fisheries in the Philippines has been deteriorating since the 1970s but initial signs of severe depletion of fish stocks to the level indicative of biological and economic overfishing occurred in 1990s. Increasing fishing population was attributed as the main cause of fishery decline. Other factors include destructive fishing, large-scale fishing in coastal waters, climate change, siltation/pollution from land-based activities and even marine protected areas establishment and tourism activities that closed some traditional fishing grounds. Important insights and policy prescriptions for improved management of small-scale fisheries are further discussed.

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1. Introduction

The Philippines is geographically situated at the heart of the Coral Triangle, the center of the world's marine biodiversity [1], but is facing enormous threats particularly from human abuses [2–4]. Overfishing, the prevalence of destructive fishing activities and other anthropogenic disturbances in the Coral Triangle are seriously undermining the sustainability of the valuable marine resources in the area [2,3]. Food security and overall well-being of the millions of poor and highly resource-dependent communities are thus seriously jeopardized. In the Philippines, where 56% of the total 1634 municipalities are coastal, fishing is an important

way of life as well as a major or sometimes the only source of livelihood for many coastal villagers [5–7].

Fishes are the last wild vertebrates being hunted in large numbers for food. Unlike other vertebrate groups, fish are much more prolific. So much so, scientists in the early 19th century, including the famous English biologist Thomas Huxley, thought fish stocks were inexhaustible [8]. However, recent advancements in fishing technology coupled with increasing fish demands from the fast growing population have resulted in widespread depletion of global fish stocks [9]. Recent estimates suggest that more than 60% of the world's fisheries are already overfished, where harvest rate has exceeded the natural growth of fish stocks [10,11]. The conditions are much worse for small fisheries which mostly lack formal assessment but comprise more than eighty percent of global catch [12]. Studies have shown signs of overfishing like drastic decline in catch [13,14] and disappearance of high trophic species [15,16]. Poverty incidence in many fishing communities is

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also very high [17–19] but see [20,21] for comprehensive discussion about the interrelationship between fishery and poverty. Further, the seemingly plateauing, if not declining, total fisheries productivity since the 1980s despite the continually increasing fishing effort [22,9] is another indication of overfishing. Some estimates suggest that many fisheries worldwide have already collapsed with current standing stocks of less than 10% of the unfished levels [23,24,14]. Despite some disagreements about the actual state of the fisheries especially among conservation and fisheries scientists [25,26,16], there is an overall consensus that the world's fisheries, with few exceptions, are in a continually declining state [10].

Historical information on fish catch and status of available fish stocks through time can provide useful insights for more adaptive and flexible management initiatives to ensure long-term sustainability of the fisheries. Various fisheries models from catch trends have been developed to understand and predict the dynamics of the fisheries [27]. Concepts like the maximum sustainable yield (MSY) and total allowable catch (TAC) have been commonly used to manage the fisheries in order to maximize human benefit without undermining long-term sustainability. However, most fisheries models are very data-intensive and reliable catch data are not always available especially for small-scale fisheries in developing countries like the Philippines.

Previous reports on catch trends in the Philippines over the last few decades have used available albeit sparse catch data [28,22]. Various government institutions have also collected and published annual catch statistics since the late 1970s. However, chronic funding problems, among other challenges associated with changes in

governing institutions and personnel, have greatly compromised the consistency and reliability of the catch statistics being produced.

In this study, local ecological knowledge (LEK) of fishers was used to investigate catch trends in Philippine small-scale fisheries over the last five decades. Fishers, as the primary resource users, may be the most knowledgeable ones in terms of what has been happening in the fishery over time [29]. Utilizing valuable insights from local knowledge in combination with other conventional management approaches has been suggested by many to be quite effective and adaptive in managing multi-species and multi-gear small-scale fisheries, particularly in areas where scientific data are either unavailable or deficient [30,31] (but see [32]).

2. Materials and methods

A total of 20 coastal municipalities all over the Philippines were surveyed (Fig. 1). Primary data were gathered through one-on-one interviews using a semi-structured questionnaire. A total of 3446 fisher respondents, whose ages ranged from 15 to 84 years old and who had been in the fishery since 2010 to as early as 1940s, were interviewed (Table 1). In each municipality, an average of 172 male fishers (range, 78–469) in 4–6 fishing villages (*barangays*) were interviewed. Only male fishers were sampled as fishing in the Philippines is generally practised by males. Respondents were chosen through snowball sampling, wherein an enumerator interviewed the first fisher encountered in a fishing village and proceeded with the next one encountered, and so on. Interviews were carried out by 10–12 local enumerators per municipality who

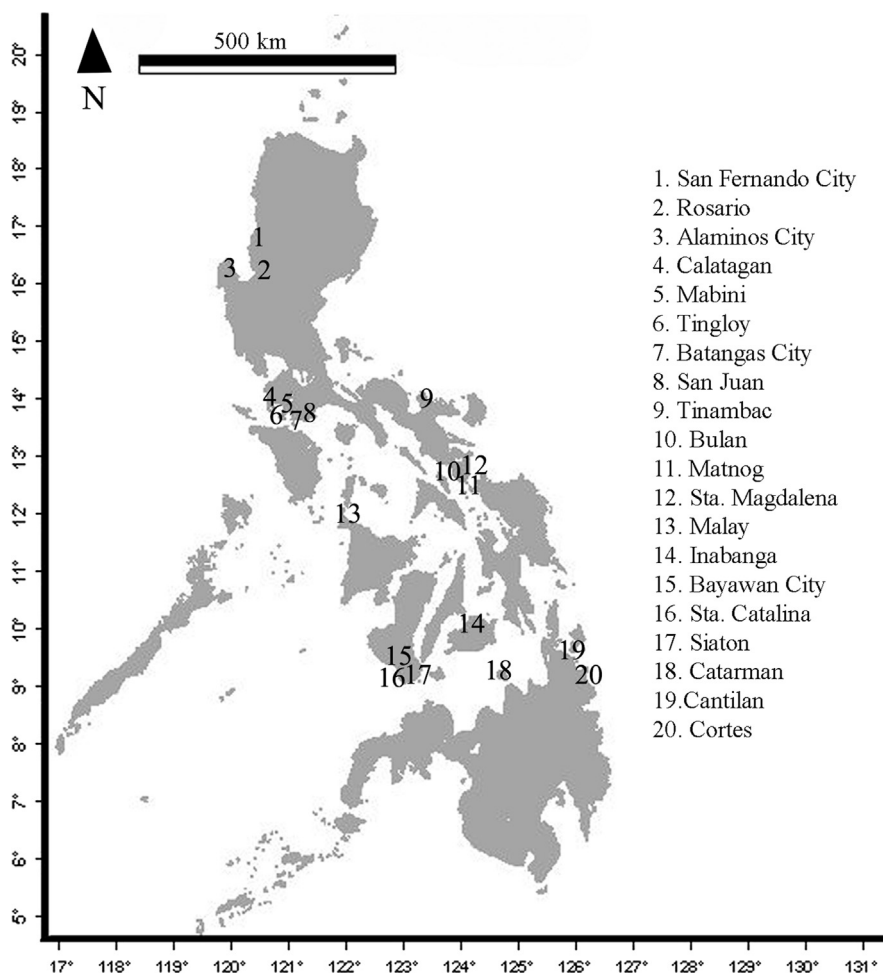


Fig. 1. Map of the Philippines showing the 20 municipalities where the study was conducted.

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