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Full Length Research Paper

An assessment of illegal fishing in Gonarezhou National Park, Zimbabwe

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Illegal fishing is a worldwide problem. In this study we present the first assessment of illegal fishing in Gonarezhou National Park (GNP), Zimbabwe. Information on illegal fishing was gathered from a total of 39 illegal fishers who were arrested within GNP between February and October 2011. Data was collected using semi-structured questionnaires that were administered through interviews. Our results showed that most of the illegal fishing was undertaken by women (*n* = 32, 82%). Most of the illegal fishers were middle-aged, less educated, and came from poor families characterised by a high number of dependents. Illegal fishing was largely carried out using fishing nets with harvested fish being sold and also being consumed at household level. Despite the perceived increase in law enforcement in GNP, respondents reported that illegal fishing had also increased due to rising poverty in communities adjacent to the park. Increasing conservation awareness, law enforcement and establishing irrigation projects would help in further reducing illegal fishing.

Keywords: Illegal fishing, law enforcement, perceptions, poverty

INTRODUCTION

Overexploitation of living resources severely affects aquatic ecosystems and is among the most serious environmental issues worldwide (Pauly et al, 2002; Agnew et al, 2009; Etiegni et al, 2011). In particular, the need to meet the protein demand of the increasing human population leads to overexploitation of the natural fish stock in the wild which often leads to inappropriate and unfriendly fishing techniques which exacerbates the declining fish yield (Chindah and Tawari, 2001).

For instance, some studies have reported a continued decline in fish catches in many aquatic ecosystems (Bearzi et al, 2006; Abiodun and Miller, 2007; Worm and Branch, 2012), particularly in developing countries (Raemaekers and Britz, 2009; Akpalu, 2011). Illegal fishing has been poorly documented in protected areas in Zimbabwe. Therefore, in this paper we present the first assessment of illegal fishing in Gonarezhou National Park (GNP), Zimbabwe, through information gathered from illegal fishers.

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MATERIALS AND METHODS

Study Area

GNP is the second largest state protected national park in Zimbabwe, covering 5,053 km^2. The park is endowed with three major rivers, namely Mwenezi, Runde and Save and numerous water pans (Figure 1; Zisadza et al, 2010). Fish species of special interest include the unique turquoise killifish (*Nothobranchius furzeri*), southern lung fish (*Protopterus annectens* ssp. *brieni*), freshwater Goby (*Rhinogobius giurinus*) and black bream (*Acanthopagrus butcheri*) (Gandiwa and Zisadza, 2010). Although GNP's water resources are largely conserved, fishing only for recreational purposes is by means of rod-and-line in prescribed water bodies with fishing being regulated by means of bag limits (Zimbabwe Parks and Wildlife Management Authority, 2011). However, fish resources in GNP are also targeted by local communities, resulting in

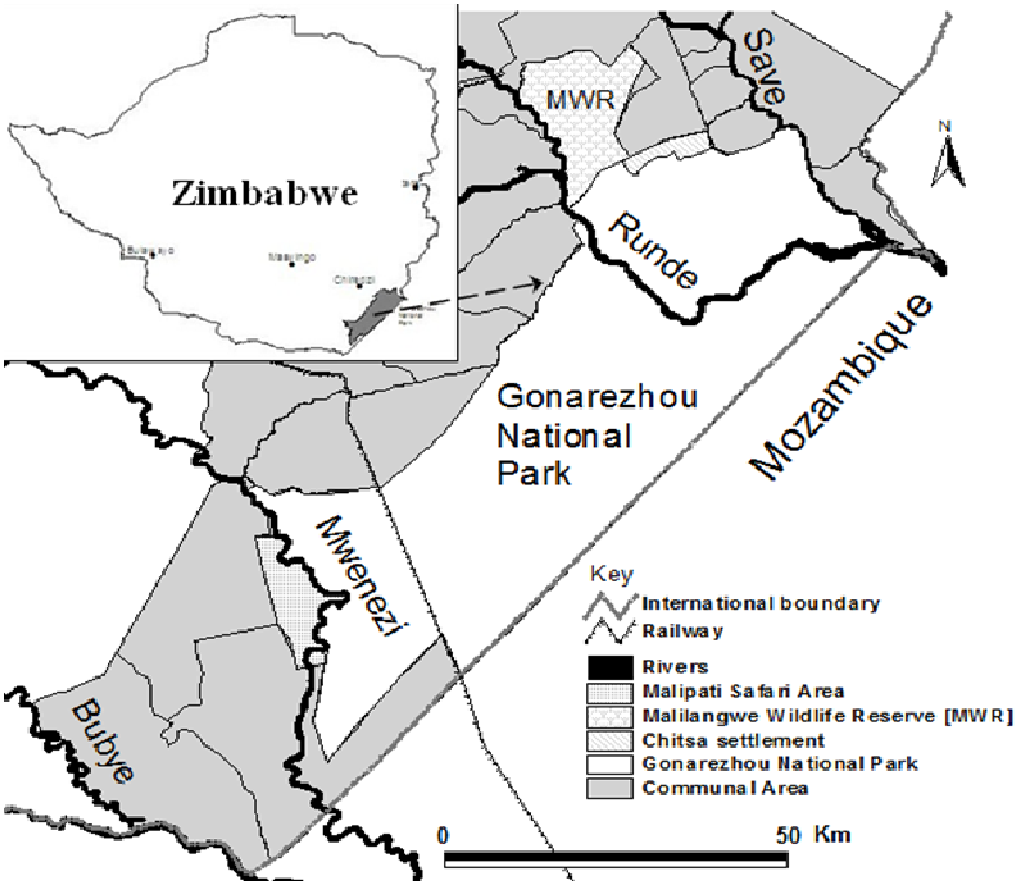

Figure 1: Location of Gonarezhou National Park showing major rivers in southeastern Zimbabwe

illegal fishing. Local communities adjacent to GNP practise crop production and livestock rearing (Gandiwa, 2012).

Data Collection And Analysis

Data were collected from a total of 39 men and women who were arrested for involvement in illegal fishing in GNP's major rivers and associated pans between February and October 2011. Interviews using a semi-structured questionnaire were the primary source of data collection. Interviews followed protocols outlined by Gandiwa (2011).

The questionnaire contained questions on the socio-economic characteristics of the illegal fishers, dynamics of illegal fishing, perceived trends of illegal fishing and law enforcement, and strategies for reducing illegal fishing. Interviews took about 20 minutes to complete. Data were summarised using descriptive statistics in SPSS version 19 for Windows (SPSS Inc., Chicago, IL, USA). Chi-square (χ^2) tests for goodness of fit were used to establish whether or not the interviewed illegal fishers varied in sex and their history of involvement in illegal fishing.

RESULTS AND DISCUSSION

This study presents, to our knowledge, the first information relating to illegal fishing in GNP. Women (n = 32, 82%) were more involved in illegal fishing in GNP than men (n = 7, 18%; χ^2 = 14.76, df = 1, P < 0.001). This is likely due to the reason that fish are easier to catch than wild animals hence the high involvement of women in illegal fishing in GNP. Most of the women involved in the illegal fishing were middle-aged with low educational qualifications, had no cattle (Table 1) but had a high number of dependants. On average, each illegal fisher had four dependants (range: 1–13). All illegal fishers lived within 10 km of the GNP boundaries. Our results lend support to the assertion that being in remote areas, undereducated and often poor with large number of dependents, the rural poor lack the means to win greater access to resources, markets and new technologies (Wetengere and Kihongo, 2011), hence resulting in the

Table 1: Socio-economic characteristics of interviewed illegal fishers (*n* = 39)

Variable	Category	Number of respondents	Percentage (%)
Age	16–20	5	13
	21–30	10	25
	31–40	14	36
	41–50	7	18
	>50	3	8
Education level	None	12	31
	Primary	25	64
	Secondary	2	5
Cattle owned	None	26	67
	1–10	11	28
	>10	2	5

illegal exploitation of resources from adjacent protected areas, for example, fish resources.

Eighteen (46%) of the interviewed illegal fishers had been previously involved in illegal fishing in GNP whereas only 21 (54%) of illegal fishers were involved in illegal hunting for the first time (χ^2 = 0.10, df = 1, *P* = 0.752). Respondents revealed that illegal fishing was conducted in groups of at least four people (maximum = 30 people). Furthermore, 46% (*n* = 18) of the illegal fishers perceived that trend of illegal fishing had increased mostly as a result of increasing poverty in the neighbouring communities due to unreliable, and generally low agricultural harvests; 36% (*n* = 14) of the illegal fishers perceived that trend of illegal fishing had declined primarily due to increase in arrests whereas only 18% (*n* = 7) of illegal fishers perceived that trend of illegal fishing had remained the same. Our results showed that thirty-two (82%) of the illegal fishers used fishing nets to catch fish whereas only seven illegal fishers (18%) used fishing rods. The main reasons for illegal fishing were given as: i) for sale (*n* = 19, 49%), ii) both for sale and domestic consumption (*n* = 11, 28%) and iii) only for domestic consumption (*n* = 9, 23%). Respondents mentioned that they sold fish in order to raise money to buy food and for other domestic purposes. This is important as the study area receives low rainfall hence the poor harvest of crops in some seasons. Elsewhere, in Madagascar, poverty was also linked to the illegal harvesting of fish resources (Le Manach et al, 2012). Fish is an important source of high quality protein in many African countries and is the subject of a substantial trade (Watson and Brashares, 2004; McGregor, 2008; Nyahongo et al, 2009; Gomna, 2011). More information is however, needed on the markets which fish serve, and the factors such as price and supply. Similarly, there is need for more research to establish the link between fish and bushmeat in the study area. This will complement current knowledge on the role of bushmeat on rural livelihoods in developing countries (e.g., Gandiwa, 2011; Oduntan et al, 2012).

In terms of law enforcement within GNP, about 90% (*n* = 35) of the illegal fishers perceived that law enforcement had increased in GNP due to increased poacher's arrests and also as a result of increased sighting of rangers on patrols inside GNP. In contrast, only 5% (*n* = 2) and 5% (*n* = 2) of the illegal fishers perceived that law enforcement in GNP had declined and remained the same respectively. The perceived increase in illegal fishing despite the perceived increase in law enforcement in GNP suggests that some of the local people have no alternative sources of income or livelihoods and had to rely on resources in GNP. A similar scenario was also reported for the Lake St Lucia Game Reserve, South Africa, where despite active law enforcement illegal netting continued to take place due to the fact that the derived benefits were greater than the risk (Mann, 1995).

Our results suggest that GNP management and other conservation partners need to collaboratively engage the communities by increasing conservation awareness campaigns and also exploring new opportunities for community projects which reduces heavy reliance on the park's natural resources (Table 2). For instance, respondents suggested the establishment of irrigation projects to allow for local people, mostly women, to be engaged in some economic activities such as the growing of crops for both sale and subsistence use. Money raised from these projects could be used to buy other protein sources hence reducing illegal fishing activities within GNP. Other strategies of further protecting the park such as enhancing law enforcement and fencing should also

Table 2: Strategies from interviewed illegal fishers on reducing illegal fishing in GNP

Strategy	Number of respondents (*n* = 39)	Percentage (%)
Increase conservation awareness	13	33
Establish irrigation projects	10	26
Enhance law enforcement within GNP	8	20
Fence some of the GNP's boundaries	5	13
Employ local people	2	5
Increase fines or penalties	1	3

be considered in the study area and similar ecosystems elsewhere as a way of further reducing illegal fishing.

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