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Participative Ecological Monitoring for Improving Biodiversity Management in National Parks of Madagascar

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Abstract

Madagascar is a premier biodiversity hotspot in the world (Ganzhorn et al. 2001, Joppa et al. 2013). Yet, what remains of its natural habitats is stressed out by human activities (Blanc-Pamard and Ramiarantsoa 2003, Primack and Ratsirarson 2005, Brinkmann et al. 2014). Protected areas can only succeed, if and when, local communities participate in their management and protection. Integrating a community-based approach for biodiversity conservation provides major biodiversity payoffs in creating a local economy tied to the local values and economy outside of traditional natural resource extraction and use (Nopper et al. 2016). Collaborations with local populations in the management of protected areas was initiated by Madagascar National Parks (MNP) in 1998. Malagasy culture emphasized familiarity with native wildlife and wildlands as part of traditional knowledge (Oliver et al. 2015). However, MNP did not effectively integrate community-based approaches although their ecological montioring protocol was titled 'Participative Ecological Monitoring'. In addition, information provided by scientific researchers also seems dispersed and unorganized within the decision-making process that guides land management.

Therefore, it would be interested to demonstrate efficacy of community-based participation on protected areas management. Local communities have high level of knowledge of local biodiversity and therefore are critical in the integration in community-based conservation. The link between local biodiversity knowledge and ecological monitoring in protected areas could be a good approach to improve PA management

Introduction

The objective of this study was to improve MNP's ecological monitoring system by intergrating the ecological monitoring participation, and test whether the data recorded by local communities can be used for the management. Therefore, we selected six PAs in three different ecosystems: two parks in rain forest (Ranomafana and Andringitra), two in transitional forest (Isalo and Andohahela) and two in dry forest (Tsimanampesotse and special reserve of Beza Mahafaly), and our observations focused upon bird, mammal, and herpetofaunal biodiversity. For selection of communities, we carried out a community consultation where the study was presented and the participation of women was sought and the community themselves selected twelve local representatives in each PA with the consent of their family. After combining local vernacular names from community-based (CB) and scientific names in the species identification guides, we trained participants in species identification, collection of biodiversity data and protocols in ecological monitoring.

Training of participants with species id guides in Andohahela National Park (Lalatiana Randriamiharisoa).

Methods

A training on standardized observation methodologies was performed with visual and audio encounter surveys, and such observations were validated via surveys performed by researchers with taxonomic expertise. During training sessions, we received informed consent from all participants, and recorded the age, education level, and gender of particpants. These demographic variables were chosen based on factors found to be important in explaining community capacity in biodiversity monitoing (Willits and Luloff 1995; O'brien et al. 2010; Xu et al. 2010).

Study participants at the Beza Mahafaly Special Reserve (Tsitohaina Randriambololona).

Results

There were 69,429 observations of individual animals during the 2019-2020 surveying period, spanning 599 days. Participants observed a total of 34 lemur species, 48 non-lemur mammal species, 221 bird species, 144 amphibian species, and 196 reptile species in the six sites confondued. Participant ages ranged from 20 to 57, and most community-based had little to no formal schooling (no formal school 12%, primary school = 46%, secondary school/college = 35%; 7% of participants excluded from demographic analyses due to missing education data). After comparison of data collected by participants and experts, we found participants encountered as many species as the experts. However, experts saw higher per-species abundance on average,

in large part because they saw far more individuals of common species. We measured the number of survey days necessary to observe all species in the estimated community, and found that the number of days was higher for the participants. This difference varies from 50 days for Andringitra and 150 days for Andohahela , compared to 15 days for Isalo and 30 days for Ranomafana.

Concerns about demographic data which could be explain on these results included differences in age. The presence of women in monitoring teams was positively correlated with observed species richness. On the contrary, education did not do so.

A model plan for ecological monitoring is the output of this study according to three factors: environmental by which the species was monitored, habitat and climate type, and demographic data. These were found to influcence ecological monitoring activities and the cost of the activity for use in the management of protected areas. In addition, community-based support is necessary for good data collection and strengthen the collaboration with managers and local communities in the conservation of protected areas.

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