Mucking in

Community participation in mangrove ecosystem restoration can be improved in Cameroon's Douala-Edea Wildlife Reserve

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Mr. Moudingo Ekindi (Cameroon) received his fellowship in 2008 to carry out DESS research titled Assessment of community participation in mangrove forest restoration in four selected villages of the Douala–Edea Wildlife Reserve: a contribution to improved social resilience of coastal communities to climate change *at the University of Yaoundé in Mouanko, Cameroon.*

Senses working overtime: Villagers gather at a sensitization meeting. *Photo: J.H. Moudingo Ekindi*

Cameroon has about 196 000 hectares of mangrove forest, which is rich in vertebrate fauna (Spalding *et al.* 2010). The 160 000-hectare, IUCN category IV Douala–Edea Wildlife Reserve (DEWR) was created in 1932 and selected as a category 1 operational technical unit (a government land-use classification) in 1994. The reserve covers part of the Cameroonian inshore plain (Ajonina and Usongo 2001), and about 10% of it is occupied by mangroves. There are six villages in the vicinity, in which foreign nationals, including from Benin, Ghana and Nigeria, comprise 80% of the population. Fishing, fish-smoking and mangrove fuelwood harvesting are their main livelihood activities; fishing is conducted mainly by men and fish-smoking mainly by women.

Very few fish-smokers have adopted the improved ovens introduced in 2003 by the Cameroon Wildlife Conservation Society (CWCS), a national NGO, to minimize fuelwood usage. This is shown by the sharp increase in the number of traditional ovens in the area, from 340 in 1997 to over 850 in 2008. There is increasing demand for mangrove wood (*Rhizophora racemosa*) due to population growth on one hand and the demand for smoked fish and fuelwood by villages on the other. These set the grounds for unremitting encroachment and the overexploitation of mangrove wood. A traditional oven can use over 5 m^3 of mangrove wood per day (Ajonina 2008). More than 84% of mangrove deforestation and degradation in the DEWR is caused by fish smoking (Ajonina *et al.* 2005).

In order to find a win–win solution to the over-use of mangrove resources, the CWCS used a participatory wetland appraisal to involve poor coastal communities in mangrove restoration activities. This approach was taken because it gives local people the opportunity to learn by doing. The key was to change attitudes to mangrove deforestation and degradation because mere protective measures have been ineffective.

Little or no study has been done in the DEWR to characterize community participation in mangrove restoration efforts. My study was conducted as part of an effort to do so. I set out to answer the following question: "Does the involvement of local people in mangrove nursery establishment and subsequent out-planting phases have a significant impact on the restoration of mangrove forests in the DEWR?"

Methods

The study was conducted in four villages—Mbiako, Yoyo 1, Yoyo 2 and Youme 2. All are located in the mangrove-dominated part of the reserve, where the CWCS has been working for over ten years. Community participation was examined through three stages: sensitization, community organization and nursery out-planting.

Both primary and secondary data were used in the analyses. The primary data were derived over a period of 14 months through two approaches, namely observational studies (phase 1; Moudingo 2007) and a questionnaire survey (phase 2). Phase 1 consisted of taking stock of the number of individuals involved in each stage, while phase 2 used a semi-structured questionnaire to interview 400 individuals to gauge recent community perceptions. The interviewees were selected using a stratified random sampling approach. The linear settlement pattern in the selected villages facilitated this sampling design. Secondary data came from

Participatory research: The author plants a mangrove seedling in the Douala–Edea Reserve. *Photo: J.H. Moudingo Ekindi*

various sources, such as articles in scientific journals, books, newsletters, and reports on community participation and on mangrove work.

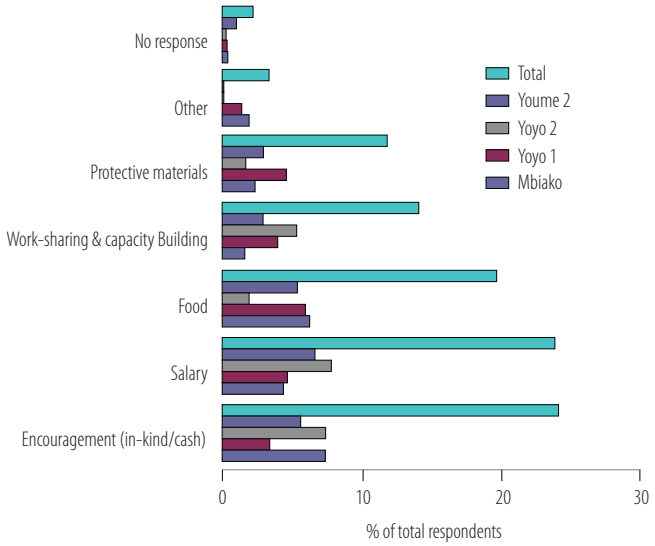
User-friendly statistic software (Microsoft Excel and the Statistics Package for Social Sciences) was used to encode and analyse raw data and to process the participatory data matrices from phases 1 and 2 respectively. To support and corroborate these results, descriptive statistics as well as inferential statistics, namely Pearson's χ^2 test and Spearman's correlation, were used.

Findings

The degree of community participation in mangrove restoration activities was highly variable and there was a marked disparity between the four villages. Fish-smokers and woodcutters were the most represented at the sensitization stage and led to the formation of village steering committees. Overall, eight committees were formed. Each village had two committees, one on mangrove restoration (known as village mangrove restoration steering committee**s**) and the other on improved smoke ovens (known as common initiative committees). Overall, women were the majority on these committees. The efforts of and synergies between participants of these two types of committee, coupled with the efforts of some other villagers, yielded close to four hectares of *R. racemosa* plantation. During the nursery and out-planting stage, most of those who participated in the *in situ* production of seedlings were men. For all stages community participation analysis revealed discrepancies in age, nationality, gender, marital status, educational level, occupation, longevity at site and

The importance of rewards

Figure 1 Community responses on willingness to participate in mangrove restoration vs the provision of incentives, DEWR



origin within and across villages but gave no clear typology of community participation.

Communities differed significantly in their responses to reforestation proposals. In the phase 2 questionnaire, many people responded that the mangroves were degraded, while others replied 'not at all degraded'. Thus, there were differing views on whether replanting was necessary. Many people were unaware of the stages involved in a successful reforestation operation. Community participation in nurseries and out-planting activities was variable: some people were eager initially to participate in the program but eventually abandoned or resisted it, while others refused outright. Most people were willing to participate in activities, but conditioned such participation on factors such as more training and especially the provision of incentives (Figure 1).

Owing to the importance of mangroves to human wellbeing, the restoration of these ecosystems and their ecological functions cannot be overemphasized. Community involvement in such efforts is essential: not only is it a low-cost approach, it also helps to educate communities on the benefits of reversing degradation and deforestation and promotes the sustainable use of resources and the protection of coastal areas. This study sets the ground for adaptive measures (anticipatory, short-term and reactive options) to broaden community participation and awareness in biological management and mitigation strategies. Although in many cases community participation in mangrove restoration in the DEWR was incidental, it was an 'eye-opener' for the communities as they organized in an attempt to secure tenurial rights. This collaboration will increase their scope to participate in the wise use of resources in the proposed Douala-Edea National Park and Wetlands of International Importance, which is about 296 000 hectares in size.

Recommendations

Based on the results of this study, the following recommendations can be made to strengthen community participation in future resource management initiatives.

Sensitization

More long-term sensitization efforts should be made to enhance the visibility of project objective(s), benefits, communication and environmental awareness. These could involve:

Mud larks: Putting mud into bags for the seedling nursery, Douala–Edea Reserve. *Photo: J.H. Moudingo Ekindi*

- The organization and introduction of environmental mangrove education in schools.
- The enactment of 'community days' for mangrove restoration.
- The use of community opinion leaders to pass the message of mangrove restoration to other members of the community.

Community organization

There is a need to establish more community groups and bring adjacent villages together, regardless of whether mangroves are important for those villages. Whatever the organizational structure chosen by collaborators, the roles and responsibilities of participants must be clearly delineated. Leadership and organizational structures should have legal ramification and should be provided with sufficient technical information and support.

Nursery and out-planting initiatives

Youth should be targeted in mangrove restoration activities because of their tremendous energy. Facilitators and villagers should monitor the success of restoration because feedback will help to inspire and empower others. Credits should be provided for the provision of assistance materials in the form of grants rather than loans. Equally, graduated sanctions should be imposed for the violation or disturbance of restored sites.

General

Overall there is a need for:

- long-term planning
- the integration of other conservation initiatives into restoration works
- increased incentives and motivation
- prudent diplomatic approaches
- further research.

Acknowledgements

The author thanks ITTO for the timely granting of the fellowship and especially Dr Chisato Aoki for her kind assistance; Professor Pelz Dieter and Dr Ajonina Gordon for information on mangroves, data analyses and statistical interpretations; Professor Amougou Akoa, Dr Mbarga Bindzi and Dr Biye Elvire for their various contributions to my knowledge; the DEWR conservator and his team of eco-guards for their collaboration; and, the chiefs and inhabitants of the selected villages for their contribution to the success of this work.

Swamped: Village men plant-out *Rhizophora racemosa* seedlings. *Photo: J.H. Moudingo Ekindi*

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