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Socioeconomic Factors Influencing the Effectiveness of Co-Management in Madagascar

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Socioeconomic factors influencing the effectiveness of Co-management

In Madagascar

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1 ABSTRACT

This study has shown whether a co-management arrangement is effective or not but also explored quantitatively for the first time the relationship between socioeconomic factors, losers' characteristics and co-management effectiveness in Madagascar with a moderate sample size. The paper found that losers were further away from the market, commercialized most of their catch, but have higher dependence on marine livelihood and fewer other occupations.

2 INTRODUCTION

2.1 Co-management definition

The co-management concept was coined by Kearney (1984) as a basis for decentralized management system (Raakjaer et al., 2002). This former is a term for partnerships involving coastal communities, state department, scientific bodies, NGOs and/or tourism operators to improve the state of the marine resources and meeting social goals (CECEEC, 2010; McClanahan et al., 2006). Co-management implies increased involvement of locals in decision-making and delegation of resources management to the users (Raakjær Nielson and Vedsmand, 1999; Raakjær Nielsen et al., 2002). The involvement of fishing communities in defining objectives and rules alters the nature of pre-existing environmental legislation from resources-oriented to societal-oriented (Raakjær Nielsen et al., 2002). The involvement of users in the decision-making process is expected to result in higher acceptance and compliance with rules thus improving marine resources management effectiveness (Pomeroy et al., 2001). Management measures are assumed to be more adaptive because indigenous knowledge is included in their development leading to more socially and environmentally sustainable systems (Raakjær Nielsen et al., 2002). Those systems have become very attractive to scientific and non-profit organizations because they empower the communities to self-enforcement of fisheries regulations and biodiversity conservation as well as reducing the need for government involvement (Cinner, 2005).

In Madagascar, the GELOSE Law (Secured local management) was enacted in 1996. This law legally recognizes the decentralized management, in other words co-management governance.

2.2 Background

In places like Madagascar, decentralized management systems have legally been recognized under the GELOSE (Local Secured Management) 1996 law to facilitate the implementation and compliance with resources management measures (Cinner, 2005). This is very important in terms of economic context of places like Madagascar where the government has a limited building capacity. Fisheries are crucial to the coastal population, most of them depending on traditional fishing to sustain their livelihoods. Their numbers are increasing as the local economy rarely offers alternatives (FAO, 2009). Therefore in response to the growing pressures and increasing social conflicts over natural resources some villages took the initiative to call on the GELOSE law.

2.3 Purpose of the study

This study aims at identifying if co-management is a viable option and characterizes the socioeconomic factors that affect the effectiveness of co-management systems. According to Pollnac & Crawford (2000) and Pomeroy et al. (2001), socio-economic factors influence the effectiveness of co-management arrangements.

People with a negative perception of the co-management arrangement will be considered as losers. Since the presence of losers is assumed to breakdown the co-management system. It will be considered that presence of losers among those co-managed sites will reduce the effectiveness of management (Cinner & Pollnac, 2007).

My main hypotheses are the following:

1. Does co-management improve livelihood of fishermen?
2. What are the characteristics of actors that lead to less effective co-management?
3. How can we better deliver co-management outcomes?

The applicability of this research is to develop strategies and processes for use and adoption by government, fishing communities, NGOs and others to achieve better conservation goals by meeting social goals and not solely ecological goals (Cinner, 2005).

3 METHODS

Empirical and theoretical research (Ostrom, 1990) and socioeconomic assessment methodologies designed for coastal communities (Pollnac, 1998) were used to select indicators expected to relate to marine resource governance in Madagascar. Those indicators were based of growing theoretical and empirical evidence that many socioeconomic conditions and demographic characteristics consideration will play an important role in shaping those governance systems, influence local's support for establishment (Ite, 1996; Allendorf, 1999) and their effectiveness (Pollnac & Crawford, 2000; Pomeroy et al., 2001; Raakjær et al., 2002; Pomeroy et al., 1996). Co-management effectiveness is based on the design and the context within which it has been design. Some of those factors such as market integration (Cinner, 2005), dependence on resources (Cinner, 2005) and occupational diversity will be thoroughly studied in this research project.

3.1 Study sites

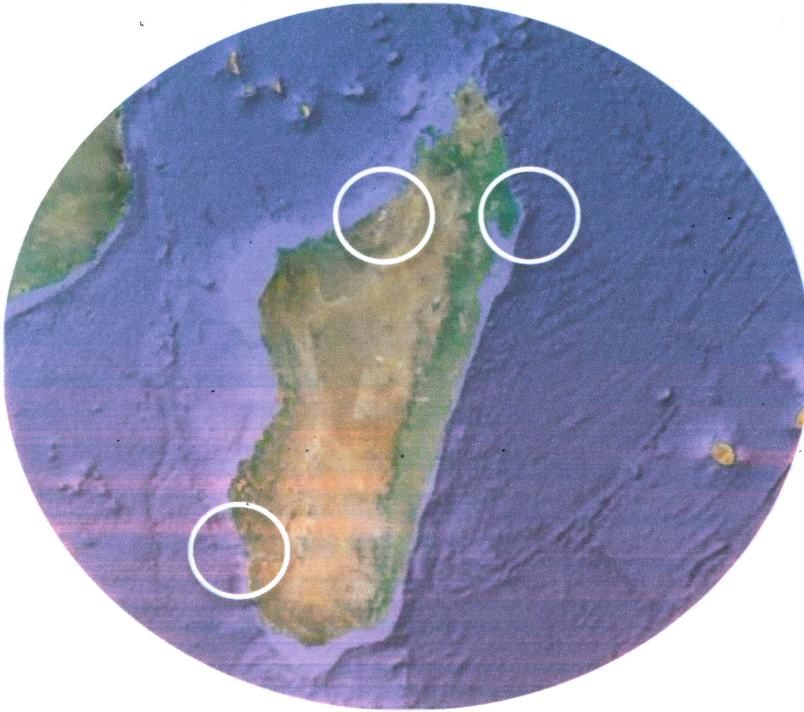


Figure 1: Map of the studied regions

3.1.1 Site description

The Wildlife Conservation Society (WCS) conducted a series of household surveys in 9 sites, across 3 regions, where co-management systems were established, which relates to the economic aspect of households, their standard and way of living as well as their involvement in marine resources management. The surveys have been led in the following sites:

1. The South Western coast of Madagascar: Famihara in the Bay of Ranobe.
2. North East coast of Madagascar: Ambodipaka, Masoala Peninsula, Tampolo, Manambia and Imorona in Antongil Bay.
3. The North West Madagascar: Berafia (Dauphin) and Nosy Valiha in Sahamalaza - Radama Islands and Nosy Sakatia (Rasis) in Nosy Be.

3.2 Data Collection

A generalized households survey method was used, i.e., the total number of households from each village was considered as a main population without distinguishing if they were marine resources users or not. The selected sampling procedure was random sampling. For the geographical distribution of the survey, each village was divided in several sectors, in order not to count and inquire a house twice, and to create skews in sampling. Each investigator was in charge of a sector. However, adopted methodology comprises several limits:

- For the main population, the exact number of households is often unknown to the Chief of Fokontany. Thus, all sampling is based on estimates of which probability cannot be appreciated.
- For the division of the sector and the counting of houses, the inexistence of an exact plan of the village also could create skews. Indeed, in spite of the fact, a plan of the village was drawn with the support of a guide.

3.3 Statistical analysis

The socioeconomic factors that influence the characteristics of losers will be studied at the household level. The SPSS 18 statistical program will be used to determine statistical significance of all conducted statistical tests. The statistical tests conducted for the purpose of this research were parametric and non-parametric tests due to the categorical nature of some of the data. Table 1 provides information on data used for the purpose of this research and figure 2 depicts the variables analyzed.

Table 1: List of socioeconomics variables surveyed for each site and their description

Dependent Variables	
Livelihood effect	-1 (negative perception); 0 (neutral perception); 1 (positive perception)
Independent Variable	
Market integration	Distance to the market (km)
Fish sold	Percentage of fish sold on the market
Marine livelihood	0 is marine livelihood is not the primary occupation and 1 is the primary occupation
Occupational Diversity	Number of different occupations per household

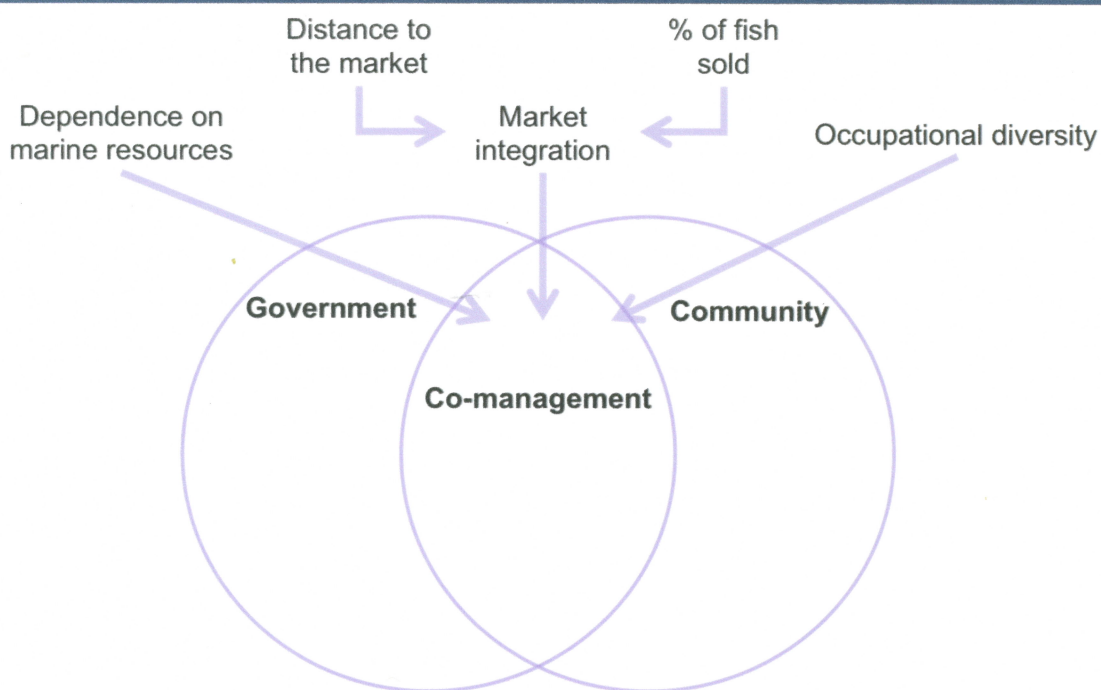


Figure 2: Variables analyzed

The socioeconomic characteristics of losers were identified using four types of statistical tests: The Kruskal Wallis, chi-square, Mann Whitney U test and multinomial/binary logistic tests were performed to discern the socioeconomic characteristics of losers. The Mann Whitney U test is a non-parametric alternative

to the T-test. The Mann-Whitney U test is used to determine whether two samples are independent (Siegel and Castellan 1988). The Mann-Whitney U test was used to identify where the losers were located according to the distance to the market. However, the distance to the market was community level variable. Therefore, the livelihood effect (3 categories) was aggregated down to 'presence' or 'absence' of losers in the 9 communities and tested against the distance to the market. The Kruskal Wallis test is an extension of the Mann Whitney U test. The Kruskal Wallis test was used to determine whether two samples are independent (Siegel and Castellan 1988). The Kruskal Wallis test was used to examine the percent of fish sold and occupational diversity influenced the losers. The chi-square test was used on interval variables, such as primary marine livelihood variable. Multinomial logistic regression was used to analyze relationships between a non-metric dependent variable and metric or dichotomous independent variables. It allows one to predict a discrete outcome from a set of variables that may be continuous, discrete, and dichotomous. A multinomial test was used on percent of fish sold and occupation diversity. A binary logistic test was used on distance to the market and primary marine livelihood due to the binary nature of the dataset. A five percent level of significance was used for the purpose of this study ($p\text{-value} < 0.05$). The analysis undertaken is described in Table 2.

Table 2: Hypothesis and statistical analysis conducted

Variable	Scale	Model	Hypothesis
Market integration			Are there losers in the community? If yes, does market integration influence their characteristics?
Distance to the market	Community	Presence/Absence of losers ~ Distance to the market	
% of fish sold	Household	Livelihood effect ~ % of Fish sold at the	
Marine livelihood	Household	Livelihood effect ~ Marine livelihood	How does the degree of dependence on fishing influence losers' characteristics?
Occupation diversity	Household	Livelihood effect ~ Multiple occupations	How does occupational diversity affect losers' characteristics?

4 RESULTS

Communities ranged from small hamlets with 139 people to large villages of 4900 people, with a median of 800. There was also a considerable range in the market influence (measured as distance to market and percentage of fish sold) on the communities. Communities ranged from 12 to 160 km from markets. The median distance to the nearest market for marine product was 25.5 km. The percentage of fish sold ranged from 2-100% with a median of 80.7%. The importance of fishing as a livelihood strategy varied considerably in the communities examined. The percentage of household that ranked fishing as their primary livelihood varied from 21.2-80.6%, with a medians of 48.4%. Occupational diversity ranged from 1.64 to 2.89 with a median of 2.22.

The Mann Whitney U test was statistically significant (0.020), showing that losers tend to be located away from the market. The multinomial test was statistically significant (0.005) showing that losers commercialized more than 95% of their catch. The chi-square test was statistically significant (0.001) showing that losers

were more dependent on marine resources. The multinomial test was statistically significant (0.003) showing that losers had fewer occupations.

5 DISCUSSION

This is one of the first studies to quantitatively explore the relationship between socioeconomic factors, losers' characteristics and co-management effectiveness in Madagascar with a moderate sample size. The paper found that losers were closer to the market, commercialized most of their catch to the market, had less occupational diverse but higher dependence on fishing.

5.1 Market integration

Market integration is measured as the distance to the market and percent of fish sold in the market. The distance to the market correlated with the presence of losers in co-management arrangement, whether the fishery was market or subsistence based (measured in the percentage of fish sold). On the other hand, the losers located close to the market commercialized more than 95% of their catch.

This suggests that the livelihood perception is undermined by connectivity to larger markets due to lack of alternative livelihood and participation in market exchanges thereby lacking the introduction of alternative livelihood and new ways of generating prestige (Agrawal, 2002).

5.2 Livelihood strategy

Marine livelihood has an impact on people's perception of co-management particularly when it is their primary occupation. The losers are the people who are mainly relying on marine resources for their livelihood. However, dependency on marine resources for either subsistence or commercial return has a mixed effect. It provides high opportunity cost by complying in the short term but provides high benefits in the long term (Sesabo et al., 1999; Sverdrup-Jensen & Raajaer, XXX). This effect could be explained by the discontentment of new restrictions and rules implemented on their fishing grounds and the lack of alternative livelihood (Njaya, 2007). A number of studies have shown that dependence on marine livelihood as primary occupation presents inter-temporal trade-offs. The return is high opportunity cost in the short term, as fishing is under new restrictions and long-term benefits such as secure livelihood and improved state of the marine environment (Tanner, 2001; Rakotoson & Tanner, 2006).

5.3 Occupational diversity

Numerous studies have shown that less diverse occupation present trade-offs. It increases the adverse effect upon the marine environment (reference). Nevertheless it leads to better compliance with the management rules implemented to protect the marine environment and secure marine livelihood (Tanner, 2001; Pollnac & Crawford, 2000).

6 CONCLUSION

This study has not only looked at whether co-management arrangements are effective or not, it has explored quantitatively for the first time the relationship between socioeconomic factors, losers' characteristics and co-management

effectiveness in Madagascar with a moderate sample size. The paper found that losers were further away from the market, commercialized most of their catch, but have a higher dependence on fishing and other occupations

Achieving a successful co-management setting requires minimizing the number of losers within the community. Losers have a negative perception and are less likely to comply with the new management rules, which in turn breaks down its effectiveness, leading to potential failure. Thereby, knowing the characteristics of losers can provide help in predicting and preventing their occurrence in co-management arrangements by:

1. Reduce effect of lack of alternative livelihood:
 - a. Alternatives
 - b. Compensation
2. Reduce effect of distance/travel cost time:
 - a. Improve infrastructure (transportation)
 - b. Improve storage of fish
 - c. Better handling procedures

→ Resulting in cheaper and better inputs & higher quality outputs and marketed outputs

Those systems are thought to become more and more attractive to scientific and non-profit organizations because they empower the communities to self-enforcement of fisheries regulations and biodiversity conservation as well as reducing the need for government involvement (Cinner, 2005).

7 REFERENCES

- Agrawal, A. (2002), Indigenous knowledge and the politics of classification. *International Social Science Journal*, 54: 287–297. doi: 10.1111/1468-2451.00382
- Allendorf, T.D. (1999) Local residents' perception of protected areas in Nepal: Beyond conflicts and economics. PhD theses. The University of Minnesota, St. Paul, 98 pp.
- CEECEC (Civil Society Engagement with ECological EConomics) (2010) *Ecological Economics from the Bottom-Up*
- Cinner, J. (2005) Socioeconomic factors influencing customary marine tenure in the Indo-Pacific. *Ecology and Society* 10(1): 36. [online] URL: <http://www.ecologyandsociety.org/vol10/iss1/art36/>
- Cinner J.E. & R.B. Pollnac (2004) Poverty, perceptions and planning: why socioeconomics matter in the management of Mexican reefs *Ocean & Coastal Management*, 47:479–493
- GELOSE (1996) *Loi de Gestion Locale Securisee*
- FAO (2009) Shrimp fishing negatively impacts on environment, New Era, Namibia <http://www.illegal-fishing.info>
- Kearney, J.F. (1984) Atlantic Fisheries and Coastal Communities: Fisheries Decision- Making Case Studies. Lamson, C. & Hanson, A.J. (eds.), pp. 165-204 (Dalhousie Ocean Studies Programme, Institute for Research and Environmental Studies, Halifax
- Ite, U. E. (1996) Conservation with development in Cross River National Park, Nigeria. Paper presented to the Workshop on Contested Terrain: West African Forestry Relations, Landscapes and Processes. 23 pp.
- McClanahan T. R., M. J. Marnane, J. E. Cinner, and W. E. Kiene (2006) A Comparison of Marine Protected Areas and Alternative Approaches to Coral-Reef Management, *Current Biology* 16, 1408–1413
- Njaya F. (2007) Governance Challenges for the Implementation of Fisheries Co-Management: Experiences from Malawi, *International Journal of the Commons*, Vol 1, no 1, Igitur, Utrecht Publishing & Archiving Services for IASC, pp. 137-153, URL: <http://www.thecommonsjournal.org>
- Ostrom, E. (1990) *Governing the commons: the evolution of institutions for collective action*. Cambridge University Press, Cambridge, United Kingdom.
- Pollnac, R. B. and B. R. Crawford. (2000a). Discovering Factors that Influence the Success of Community-Based Marine Protected Areas in the Visayas, Philippines. Coastal Management Report # 2229. PCAMRD Book Series No. 33. Coastal Resources Center, University of Rhode Island, Narragansett, RI, USA, and Philippine Council for Aquatic and Marine Research and Development, Los Banos, Laguna, Philippines.
- Pollnac, R. B., and B. Crawford (2000b) Assessing behavioral aspects of coastal resource use. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island, USA.
- Pollnac, R. B. (1998) Rapid assessment of management parameters for coral reefs. University of Rhode Island, Coastal Resources Center, Narragansett, Rhode Island, USA.
- Pomeroy, R., R. Pollnac, C. Predo and B. Katon (1996) Impact evaluation of community-based coastal resource management projects in the Philippines, 38-282. Fisheries Co-management Research Project Research Report No. 3. Manila: ICLARM.

Pomeroy R. S., B. M. Katon, I. Harkes (2001) Conditions affecting the success of fisheries co-management: lessons from Asia, *Marine Policy* 25 (2001) 197–208

Pomeroy R. S., B.M. Katon and I. Harkes (xxxx) Fisheries Co-management: Key Conditions and Principles Drawn from Asian Experiences, International Center for Living Aquatic Resources Management

Raakjær Nielson J. and T. Vedsmand (1999) User Participation and Institutional Change in Fisheries Management: A viable alternative to the failures of A Top-down driven control?, *Ocean and Coastal Management* 42 (1):19-37

Raakjær Nielsen J., Degnbol K., Kuperan V. and Mahfuzuddin A. (2002) Fisheries Co-Management - An Institutional Innovation, Perspectives and Challenges Ahead, IIFET 2002 paper no 216

Rakotoson L.R. & Tanner K. (2006) Community-based governance of coastal zone and marine resources in Madagascar, *Ocean and Coastal Management*, 49: 855-872

Sesabo J. K., H. Lang, R. S. J. Tol (1999) Perceived Attitude and Marine Protected Areas (MPAs) establishment: Why households' characteristics matters in Coastal resources conservation initiatives in Tanzania, Working Paper FNU-99

Siegel, S. and N. J. Castellan (1988) *Nonparametric statistics for the behavioral sciences*. McGraw-Hill, New York, USA.

Sten Sverdrup-Jensen and Jesper Raakjær Nielsen (xxx) Co-management in small-scale fisheries: A synthesis of Southern and West African experiences Institute for Fisheries Management and Coastal Community Development (IFM)

Tanner K. (2001) Tourism Paradox, InterCoast Network, International Newsletter for Coastal Management