Ocean and Coastal Management 163 (2018) 304–322

Contents lists available at ScienceDirect

Ocean and Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

Use of community perceptions to evaluate and adapt coastal resource management practices in the Philippines

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ARTICLE INFO

Keywords:
Coastal resource management
Co-management
Management evaluation
Community perceptions

ABSTRACT

Coastal resource management (CRM) programs have been implemented in the Philippines since the 1980s with the specific intent to protect and rehabilitate coastal habitats and enhance the sustainability of coastal communities. However, the implementation of these programs alone does not guarantee the success of program objectives. Monitoring and evaluation of program outcomes is essential for determining if programs are effective in reaching management goals. The purpose of this research was to evaluate long-term CRM programs using community perceptions of coastal resource condition, management practices, and program outcomes. Coastal residents in Baybay City, Leyte were surveyed and asked to rank a series of questions related to resource condition and 20 previously described management performance indicators. Respondents reported a decline in coastal resource condition over the past decade, even though they perceive positive outcomes of management programs aimed at enhancing resource condition. The sustainability and efficiency of management outcomes were perceived positively, with mixed views on equity outcomes. Results suggest that lack of full inclusion, low management oversight, and threat to coastal resources are concerns of the coastal community. Socioeconomic data collected from respondents yielded a pattern indicating that gender, self-reported level of environmental knowledge, and management cluster were significant contextual variables associated with perceptions of respondents. Overall, CRM programs are perceived to have a positive impact and there is a high level of interest for participating in future management activities. This study exemplifies how perceptions and associated contextual information of the community provides invaluable insights into the effectiveness of coastal resource management and be incorporated into the adaptive management cycle.

1. Introduction

A great challenge to environmental sustainability is management of both natural resources and the people relying on them for food and livelihood. Globally, the health of coastal ecosystems is declining due to natural and anthropogenic stressors, such as disturbances (like tropical storms), disease outbreaks, increasing ocean temperatures, overharvesting and pollution (Burke et al., 2012; Hughes et al., 2017; Wilkinson, 2008). Coral reefs in the Philippines are recognized as a marine biodiversity hotspot, supporting some of the most diverse and abundant coral reef communities (Longhurst et al., 2012; Wilkinson, 2008). However, despite this recognition, the condition of Philippine reefs has also declined significantly in the past few decades, with less than 10% considered “very healthy” or “healthy” (Burke et al., 2012; Tun et al., 2008). Physical reef degradation contributes to declining fish stocks and a decrease in overall marine biodiversity, as healthy and structurally complex reefs are needed to support higher species diversity (Carpenter et al., 1981; Gratwicke and Speight, 2005; Risk, 1972). These ecological losses cascade into the realm of socio-economic concerns because a majority of people in the Philippines rely on coral reefs for livelihood, food, and coastal protection from storms (Longhurst et al., 2012; Tun et al., 2008).

Coastal resource management (CRM) programs are widely implemented in the Philippines to address social-ecological concerns such as natural resource decline and food security. Traditionally, management came in the form of top-down regulatory control and development of fisheries from the national government (Pomeroy and Carlos, 1997). Since the 1970s and 80s, systems of bottom-up management, such as community-based or co-management regimes, have evolved between local governments and stakeholder groups. These systems were adopted to create an adaptive and participatory approach to management and foster the inclusion of fisherfolk in management activities (Aldon et al., 2011; Maliao et al., 2009; Pomeroy et al., 1997; Webb et al., 2004). Stakeholder engagement empowers community members to identify

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https://doi.org/10.1016/j.ocecoaman.2018.07.008
Received 12 February 2018; Received in revised form 1 May 2018; Accepted 5 July 2018

important issues related to natural resources and increases understanding of how management can help solve socio-ecological problems (Alcala, 1998; Garces et al., 2013; White and Vogt, 2000). Additionally, previous studies demonstrate that stakeholder engagement increases documentation of local knowledge and increases the breadth of community awareness and participation in management processes (Aldon et al., 2011; Andalecio, 2011; Slinger et al., 2005). While CRM remains a legal responsibility of local and regional governmental agencies, it is widely accepted that management intervention is more successful and sustainable when stakeholder groups are involved in CRM planning and operation (for example, Andalecio, 2011; Pollnac et al., 2001; Rist et al., 2013; White and Vogt, 2000).

However, the implementation of community-based management programs alone does not guarantee successful protection or recovery of coastal ecosystems. Monitoring and evaluation of CRM programs is paramount in determining management effectiveness and is the basis for adaptive management. The term adaptive management has varying definitions; it generally refers to the process of learning from management outcomes in order to modify and improve management techniques (Williams et al., 2009). Reflection of previous experiences, assessment of progress towards social and biological goals, and identification of external pressures influencing the success of management programs are critical steps in the learning process and can be achieved through monitoring and evaluation (Olsen et al., 1997). Yet, many times CRM programs are implemented or sustained without a proper evaluation of its effectiveness in a particular community.

A variety of CRM evaluation frameworks already exist that aim to assess whether or not management objectives are being met, whether they be biological, social, or economical in nature (Bunce and Pomeroy, 2003; Pomeroy et al., 2004, 1997). Evaluation of biological outcomes can be logistically difficult, and oftentimes comprehensive quantitative data regarding natural resource condition is lacking due to insufficient funding or resources. Researchers and resource managers can use socio-economic surveys to fill these data gaps in CRM evaluation and provide community assessments of CRM program outcomes (Aldon et al., 2011; Fabinyi, 2008; Pomeroy et al., 2005; Webb et al., 2004). By using community perceptions, it may be possible to characterize perceived trends of natural resource condition and use, as well as gain insight on the equity, efficiency and sustainability of management interventions (Pomeroy et al., 1997). Additionally, if the development of CRM programs is a participatory process, then its evaluation should be as well. Inclusion of resource users in the evaluation process is inexpensive, feasible, and can provide a thorough assessment of management outcomes (Andalecio, 2011).

As systems of co-management continue to evolve, more information is necessary to identify both the factors contributing to successful co-management and factors or situations that hinder the sustainability of such initiatives (Pomeroy and Ahmed, 2006). Many studies have employed the use of perceptions to evaluate management outcomes with a focus on fisherfolk, whom are considered to be direct beneficiaries of most management programs (Genio et al., 2007; Islam et al., 2016; Uychiaoco et al., 2005; Webb et al., 2004). However, less attention has been placed on the perception or involvement of the broader community in CRM programming. The behaviors and attitudes of indirect beneficiaries contributes to the success or failure of CRM because they are residents of coastal communities and are also utilizing coastal resources. There is a continued need to understand full community-wide perceptions of management outcomes in order to provide the most comprehensive knowledge base for adaptive management.

The purpose of this study is to evaluate the performance of a long-term CRM program using whole community perceptions of coastal resource condition and management outcomes. This study employed social surveys using previously tested CRM performance indicators (Pomeroy et al., 1997; Webb et al., 2004). Community perceptions were measured by having respondents rank a series of questions on a 5-point Likert scale. The survey was deployed in Baybay City, Leyte, where co-managed CRM programs have been implemented here for the past 20 years to address the issue of coastal resource degradation, yet there has been little to no management evaluation. The objectives of this study were to 1) Determine the perceived condition of coastal resources, 2) Determine the perceived impact of CRM programs, and 3) Identify any correlation between socio-economic variables and how respondents perceived CRM success indicators.

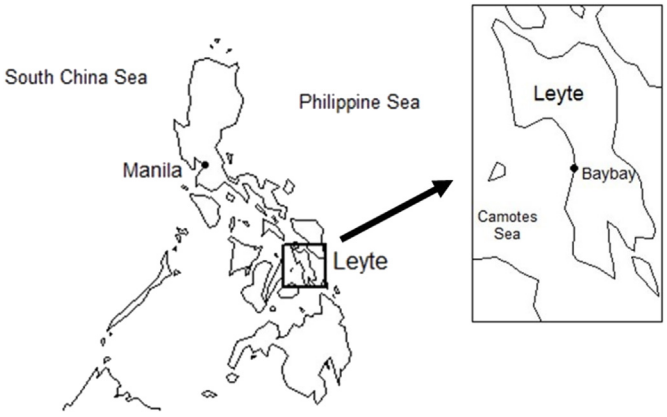

Fig. 1. Map of Philippines, showing location of Baybay, Leyte.

The results of this study provide insights on which socio-economic factors influence the success of co-management and how different community members are participating in the planning and decision-making processes involved in CRM. This study found that a respondent's gender influences perceptions of equity, with females perceiving lower levels of equity than male respondents. Additionally, a pattern emerged in which respondent's perceptions of inclusion, management oversight, and threat to coastal resources varied based on location (management cluster), level of environmental knowledge, and economic status. Overall, this study provides the first comprehensive evaluation of CRM programming in Baybay, Leyte and provides contextual information which CRM leaders can use to adapt management practices to address concerns of residents and enhance community support for CRM initiatives in the future.

2. Materials and methods

2.1. Study site

Baybay City is located in the Province of Leyte, in the Eastern Visayas region of the Philippines (Fig. 1). As of 2015, the population of Baybay City was 109,432 people with approximately 50% of the population living along the 37 km-long coast.[2] There are 28 coastal barangays (villages), all of which share a border with the Camotes Sea. Fishing is a major livelihood of Baybay City residents. As of 2014, there were over 2000 registered fisherfolk that included subsistence fishers, gleaners, and fish vendors. A report from the City Planning and Development Office documented that almost half of all the barangays in Baybay listed fisheries as their primary source of livelihood and food supply (Baybay City Land Use Plan, 2009–2013, 2009).

2.1.1. Coastal resource management structure in Baybay

All coastal barangays are under the jurisdiction of the Coastal Resources and Fisheries Management Office (CRFMO) of the Local Government Unit (LGU). The CRFMO has further designated these coastal barangays into three management clusters based on geographical location: North, Central, South. There is a system of co-

[2] Population census from: https://psa.gov.ph/content/philippine-population-surpassed-100-million-mark-results-2015-census-population.