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Research article

Effectiveness of community-based mangrove management for sustainable resource use and livelihood support: A case study of four villages in Central Java, Indonesia

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ABSTRACT

Community-Based Mangrove Management (CBMM) is implemented with different approaches and outcomes. This study examined the effectiveness of various CBMM practices to achieve sustainable management of mangrove resources. We analyzed local mangrove resource management strategies in four coastal villages (e.g. Sriwulan, Bedono, Timbulsloko, and Surodadi) on Central Java, Indonesia. Local data on institutions, socio-economic conditions and mangrove resources utilization was collected through participatory resource mapping and interviews with 16 key actors and 500 households. The main differences in CBMM-practices that affect the outcomes in each village were the type of community participation, the level of organizational and economic assistance from external institutions, the magnitude of the rehabilitation project, the time selected for rehabilitation and the maintenance strategies applied in each village. Surodadi achieved most in terms of both efficient resource utilization and local livelihood improvement. Bedono's management strategy was most effective in extending and maintaining the rehabilitated mangrove areas but less in terms of livelihood support while the strategy applied in Timbulsloko resulted in higher resource utilization compared to Surodadi. Sriwulan failed on most criteria. This study suggests that combining the management strategies practiced in Bedono and Surodadi and adding external scientific and technological assistance, income diversification, institutional reinforcement and continuous monitoring of the functioning of local institutions can improve the CBMM performance to sustainably manage mangrove resources and improve livelihoods.

1. Introduction

Mangroves provide multiple services to coastal communities such as food, fuelwood, medicines, and other non-timber forest products (Bandaranayake, 1998; Sathirathai and Barbier, 2001; Hussain and Badola, 2010; Brander et al., 2012). These resources have been used by local people for both subsistence and commercial purposes for decades (Sathirathai and Barbier, 2001; Glaser, 2003) and have substantially contributed to the sustainability and resilience of local economies (Hussain and Badola, 2010; Uddin et al., 2013). For example, Sundarban's mangroves provide various non-timber forest products (NTFP) that contribute to nearly 79% of the annual household income (Singh et al., 2010). Furthermore, mangrove replanting by the Buswang community in the Philippines supports local annual incomes between US$550 to US$2300 per ha through tourism and the provision of food and timber (Walton et al., 2006a). This last study is a good example of the return of services, and their economic benefits, after mangrove ecosystem rehabilitation by local communities.

Community engagement in mangrove management or broadly known as community-based mangrove management (CBMM) is now seen as crucial in minimizing human disturbance and achieving sustainable use of mangrove resources (Erftenmeijer and Bualuang, 2002; Walters, 2004; Biswas et al., 2009). CBMM emphasizes community participation in resource identification, setting development priorities, and selection and adaptation of technologies for sustainable management practices (Datta et al., 2012). CBMM initiatives have now been widely adopted in many developing countries including Indonesia and have become a mainstream approach. Its implementation in Indonesia is considered as highly successful in contributing to ecological, economic,

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socio-cultural and institutional sustainability (Datta et al., 2012).

Through CBMM, Indonesia has been able to restore more than 100 km^2 of its mangrove forests (Field, 1999; Ronnback et al., 2007). This restoration initiative did not only come from the government and NGOs but also from within the communities. The villagers in Tongke-tongke, Sinjai District, South Sulawesi, for example, succeeded in rehabilitating and managing 32ha of their coastal area without outside assistance. This local initiative was motivated by the need for firewood and protection from storm and abrasion (Amri, 2008; Meilasari-Sugiana, 2012a, 2012b). Currently, this restored mangrove ecosystem has become an important source of livelihood for small-scale fishers in the village by providing shellfish and other commercial crustaceans (Amri, 2008).

In practice, different CBMM approaches exist. However, not all these approaches are equally successful in achieving sustainable use (Walters, 2004; Amri, 2008; Sudtongkong and Webb, 2008; Datta et al., 2012). In some cases, mangrove rehabilitated areas are subject to land tenure problems and ecosystems are still converted into aquaculture, particularly in privately owned rehabilitated ecosystems (Walters, 2004; Walton et al., 2006a; Amri, 2008; Meilasari-Sugiana, 2012a). Harvesting pressure and unsustainable fishing activities have become potential threats in some areas (Walters, 2004). For some people, reconverting the rehabilitated areas into aquaculture was the ultimate motive of their participation in mangrove management (Walters, 2004; Amri, 2008; Meilasari-Sugiana, 2012b). The argument that CBMM is the most viable approach for sustainable mangrove management and especially to achieve the desired economic objective to secure local livelihoods thus needs to be validated. The study presented in this paper, therefore, examines the effectiveness of different CBMM practices to achieve sustainable management of mangrove resources while simultaneously improving local livelihoods.

2. Study area

The study area is the Sayung Sub-district, Demak District,

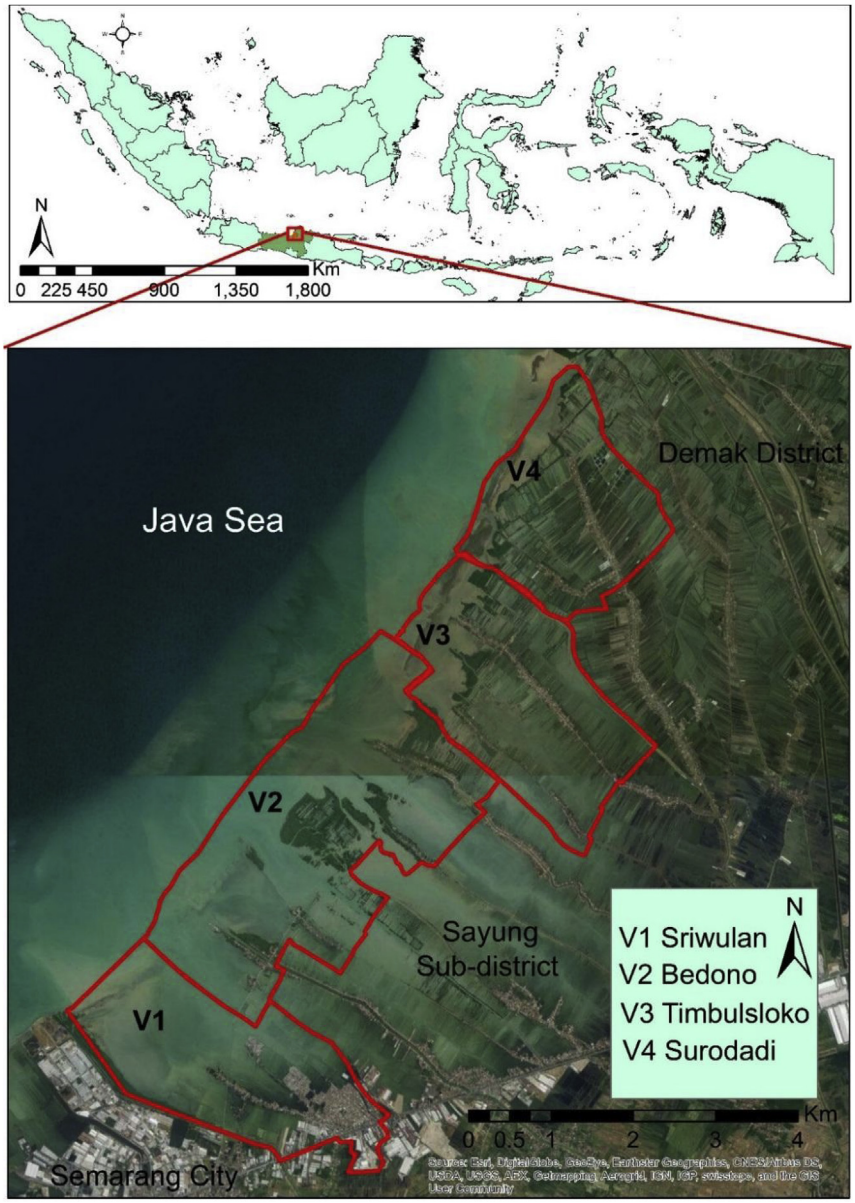

Fig. 1. Map of the study area.