

Let's integrate the voice of citizens into decision analysis - prioritizing social-economic and social-ecological objectives within mangrove management in Johor, Malaysia

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Mangroves form a unique coastal wetland type that has been identified as one of the key life support systems, providing valuable natural resources and ecosystem services for both animal and human populations. Despite their importance, mangrove ecosystems are being destroyed three to five times faster than any other forest type. Our study will focus on mangrove management in the southern state of Johor in Malaysia, which encompasses a total of approximately 20,533 ha of mangrove forests. Malaysia is identified as problematic region and hotspot for mangrove deforestation, linked to aquaculture as well as reclamation for agriculture and infrastructure expansion (e.g. Iskandar Malaysia). The rapid loss of mangroves in favour of economic development highlights the importance of appropriate management and conservation strategies. However, obtaining such management strategies requires congruence among stakeholders and due to different and often conflicting interests, this is easier said than done. Incentivization is crucial to make sure ecosystem goods and services will be handled in a sustainable manner for generations to come, and efficiently including all stakeholders in the policy-making process is imperative. Decision making in mangrove management and conservation while remaining inclusive towards stakeholder and actor perspectives, can be facilitated through Decision Analysis. This is a methodology that facilitates decision makers to select the best out of several alternative management options. This decision is based on how well the alternatives meet stakeholder values and perspectives, which are integrated in the form of 'objectives' (e.g. ecological, socio-ecological and socio-economic objectives). In this research we focus on the crucial and often underestimated step in Decision Analysis of identifying and prioritizing social-economic and social-ecological objectives of local citizens affected by mangrove management plans, a crucial stakeholder group. We aim to do this by using the Q-methodology (QM) where respondents are asked to rank statements relative to their own values and perspectives along an ordinal scale, ranging from -3 (strongly disagree) over 0 (no opinion or too sensitive to rank) to +3 (strongly agree). We will conduct the survey using random stratified sampling of respondents in settlements adjacent to mangrove forest in Johor, mainly near the Sungai Pulai and the Sungai Johor river basin. This will include different social-economic settings, including rural and peri-urban settlements.

The primary objectives of this research can be summarized by the following three questions:

1. Which socio-economic and socio-ecological objectives (means and process objectives) are most important when it comes to mangrove management and conservation in rural settings?
2. Which socio-economic and socio-ecological objectives (means and process objectives) are most important when it comes to mangrove management and conservation in urban settings?
3. Are socio-economic objectives considered more important than socio-ecological objectives by local inhabitants affected by the decision analysis?

Ultimately, the overarching aim of this research is to do this in a repeatable way and design an adaptable Decision Analysis framework that can be applied in varied mangrove settings.

Keywords: mangrove conservation; Malaysia; Q-methodology; rural communities; decision analysis