Enhancing social adaptive capacity and conservation initiatives to avoid socio-ecological traps: a case study in coral reefs in the Western Indian Ocean.

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Human societies and ecosystems they depend on are facing an unprecedented environmental crisis. Climate change is recognised as one of the strongest transformative force on ecosystems, adversely affecting ecosystems worldwide and the millions of people dependent on it who will have to adapt to those new environmental conditions and novel ecosystems. To avoid local communities to fall into socio-ecological traps, governments, development agencies and non-governmental organisations urgently need decision support information for place-based climate change adaptation actions. It is therefore crucial to identify i) conditions that can influence social adaptive capacity of local communities to climate change and ii) actual and future socio-ecological conditions that might lead local communities to experience socio-ecological traps now in the future.

We investigated the determinants of social adaptive capacity in small-scale fisheries communities in Madagascar and Kenya in the Western Indian Ocean, as well as associated ecological conditions. Combined social adaptive capacity and ecological conditions revealed that 80% of fishers’ communities in the WIO were experiencing socio-ecological states that could lead to socio-ecological traps, while 10% were potentially already experiencing socio-ecological traps. We further demonstrated that fishers’ communities already at the bridge of socio-ecological traps would face higher climate stress exposure in the future.

Proactive strategies of governance to both sustain i) the capacity of ecosystems to provide multiple ecosystem services and ii) enhance crucial components of well-being are therefore crucial. We further investigated the determinants of social adaptive capacity and ecological conditions in the vicinity of the fishers' communities. We found that isolation from a market and climate stress had a significant negative influence on social adaptive capacity, while a higher level of education had a positive influence. Also, overall, resources management through marine protected areas and locally marine managed areas had a positive influence on ecological conditions, albeit with some exceptions, particularly in Kenya.

This study demonstrates the inevitable tradeoff between conservation and development initiatives. While increase market accessibility for fishers’ communities can increase social adaptive capacity, its consequences on natural resources will be detrimental, with expected consequences on ecosystems benefits and fishers’ wellbeing.
Enabling market access through development initiatives need to be conducted alongside conservation projects that have initially acknowledged those trade-offs to ensure both it is ecologically effective and ethical, with fishers well-being and coastal ecosystems integrity as the ultimate long-term goals.