Mangrove restoration, keys to success?

Ruben Foquet, School of Geography, Earth and Environmental Sciences
University of Birmingham
r.foquet@pgr.bham.ac.uk

BIFOR
BIRMINGHAM INSTITUTE OF FOREST RESEARCH

The Forest Edge
Doctoral Scholarship Programme

UNIVERSITY OF BIRMINGHAM

Introduction

Mangrove forests are valuable coastal ecosystems found in tropical and subtropical regions. They are important habitats, store high amounts of carbon and protect coastlines against natural calamities and erosion. Mangroves provide a wide range of ecosystem services to local communities. However, globally, coastal areas covered with mangrove forest are changing dramatically. Mangrove forests are converted into urban areas, shrimp ponds or agricultural fields, or degraded resulting from wood extraction for construction, charcoal and fuelwood.

Restoring mangrove forests is essential in curbing the trend. However, mangrove restoration projects often do not achieve the predetermined goals. Part of the failure results from physical factors such as planting species in too wet conditions or planting mono-cultures, which decreases forest resilience. The impact of socio-economic drivers is crucial as well, because often the dependence on mangrove forests is high and governance is inadequate. Hence, there are multiple interdisciplinary challenges in developing sustainable and effective restoration of mangroves.

The following four topics focus on several aspects of the complex restoration process, studying the research-implementation gap, the hydrological preconditions of restoration, mangrove catchments and restoration monitoring.

Mind the gap

The science – implementation gap has been recognized in different conservation/restoration fields. I investigate whether a gap also challenges mangrove restoration projects, while contributing to a research agenda tailored to restoration practitioners needs.

1. To what extent is restoration literature used by restoration practitioners?
2. How do science - implementation gaps manifest themselves and how do they differ between different socio-economic contexts?
3. Which research fields require increased focus?

Methodology

Questionnaires/face-to-face interviews with practitioners and science translators
Focus on Africa: Kenya, Madagascar, Mozambique, Tanzania

Mangrove catchments

The influence of upstream land management on the sustainability of mangrove restoration projects is under-researched. Sediment fluxes are essential in safeguarding the balance of mangrove elevation and sea level rise, while nutrient fluxes influence local environmental conditions shaping the mangrove ecosystem. I focus on the implications for catchment management with a socio-economic /institutional lens.

1. Nutrient/sediment mangrove interactions
2. Nutrient/sediment catchment interactions
3. Catchment implications

Hydrological/salinity classification

Both hydrological and salinity characteristics influence mangrove establishment. Both are crucial when planting/assisting natural regeneration of mangroves. A characterization of salinity tolerance and hydrological classification of Eastern African mangrove species enables better informed restoration projects.

1. How can the South-east Asian hydrological classification be adapted to fit the Eastern African context?
2. How do we develop a species-specific salinity classification system for Eastern Africa?

Methodology

EC and water level measurements in field.
Vegetation surveys.

Monitoring

Measuring performance is essential to enable adaptive management of restoration projects. There is a lack of standardized methods to monitor mangrove restoration outcomes, hindering our understanding of restoration. This chapter will shed light on which attributes of mangroves are often measured/should be measured, bearing in mind the restoration goals.

1. How is monitoring conducted?
   Ecological/economic/social parameters evaluated?
2. Which indicators are suggested/proposed?
3. Is a consensual monitoring framework desired?
   Compile an automated indicator generator depending on the restoration goals?

Methodology

Qualitative literature review.
If consensual monitoring framework desired, Delphi method.

Impact

Support science-based restoration projects
More effective and holistic restoration

Inform policy makers
Facilitate adaptive management

Dr. Anne Van Loon, Prof. Dr. Fiona Nunan, Prof. Dr. Stefan Krause

https://commons.wikimedia.org/wiki/File:Carabane-Mangrove.JPG
https://commons.wikimedia.org/wiki/File:Sundarbans.jpg