

Project Update: February 2014

Objectives

The objective of the study was understand how mangrove forests in the Andaman Islands, affected by the 2004 tsunami and earthquake were recovering. This was done in two stages:

- 1) Assessing the changes brought about by the tsunami and earthquake, through literature surveys, geological survey reports and local community interviews.
- 2) Assessing the specific impact of these changes through measuring abundance and species composition of flora in damaged and intact forests through stratified plots.
- 3) Measuring microhabitat characteristics that may affect regeneration.
- 4) Dissemination of this information.

Current achievements

- 1) Changes from the tsunami and earthquake:

Through geological studies in the Andamans post-tsunami and interviews with local residents (partially funded by Ravi Sankaran Inlaks Fellowship) we have broadly categorised two major impacts of the 2004 earthquake and tsunami. The Andaman Plate has shifted with the earthquake, causing South Andaman plate to subside by approximately 5 m, while the North Andaman Plate has uplifted by nearly 1 m. Interviews with long term residents in the area confirm these reports. Such a change in island plates may be leading to changes in topography and inundation levels.

Due to the subsidence effect, sites in the South Andamans for instance have been experiencing greater flooding leading to wipe out of littoral-terrestrial forest species and spread of true mangrove species such as *Rhizophora mucronata* even in agricultural fields. Sites in the north have risen above the tide line, leading to drying out of previous mangrove forests. These sites appear to be taken over by terrestrial littoral forest species. Such changes are important to note, as they may indicate ecosystem shifts, from agricultural-littoral forest complex to mangroves in the South and mangrove to littoral forest systems in the north.



A field assistant measuring the height of a *Ceriops decandra* sub adult

We believe this information will be vital for the local Forest Department, planning mangrove restoration activities.

- 2) Flora abundance and composition

Two sites in the South Andaman region, in the Wandoor region on the west coast of Andamans and Shoal Bay in the east coast have been completed. The sites have been mapped to understand inundation sources, species zonation and topography. To measure abundance and species composition we set up 10 m radius circular plots across varying levels of inundation in both damaged and intact areas. Within these plots, we counted all adult trees, seedlings, saplings and mangrove associates like creepers, ferns and epiphytes. This will illustrate how

many mangrove species are colonising the damaged areas in relation to intact areas and also provide us with comparisons with other parts of the islands. We are recording tree phenology and human disturbance signs opportunistically. Forty such plots have been

Herbivory by littorina snails on *Heritiera formos* sapling



completed. Our aim is to finish minimum of 40 more in North Andaman Island.

3) Microhabitat characteristics

In order to determine what factors aid and constrain regeneration of different mangrove species, we have measured variables like salinity, light, eh-pH balance in soil and levels of propagule herbivory as well

as seedling herbivory in the Wandoor site. These will be measured again during the monsoon. Additionally we have measured invertebrate fauna abundance and composition to create baseline information for the Wandoor site.



[L] *Excoecaria* saplings which have disappeared from areas where land has subsided

[R] *Lumnitzera littorea* tree flowering

4) In collaboration with the Andaman Nicobar

Environmental Team (ANET), a local NGO active in the Andamans, we are in process of making a short educational documentary for local children as well as school students from mainland India who visit ANET. A link

to the film will be uploaded shortly on the Rufford webpage.

Next

- 1) Our next step is to finish objective 2 and 3 in the two plots in North Andamans.
- 2) As mentioned in the initial proposal the Wandoor site will be part of a long term monitoring project in order to understand mangrove forest regeneration over a greater period.
- 3) Day long educational programmes about mangrove ecosystems have been organised for two local schools as well as the Teachers Training Institute (that trains primary and high school teachers for the Andamans).
- 4) Reports and presentations to the Forest Department

Changes from the original proposal

- 1) I plan to put the nursery experiments on hold at the moment. From my field experience I believe that finishing all the field surveys will yield better understanding of how the nursery experiments should be designed.

- 2) Additional sites in North Andamans have been added as this will help compare two very different impacts of the tsunami across the islands.
- 3) Protected areas may not be covered as permits to sample protected areas have been inordinately delayed.
- 4) I additionally plan to survey agricultural fields submerged by the tsunami in South Andamans, where natural mangrove forest regeneration appears to be occurring. This will provide interesting view into the spread of a natural ecosystem back into a human modified landscape. This will also help us understand if these now uncultivable lands may potentially make good sites for experiments with mangrove restoration.
- 5) As part of the education and awareness objective, I am working on a short educational film in collaboration with ANET. This was not part of the original proposal, but will be a valuable addition to the project.