

# Critters@Lembeh: Final Report Housereef Project

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## Introduction

This volunteer project ran over the course of five weeks, from the 25<sup>th</sup> of June 2015 until the 2<sup>nd</sup> of August 2015. We came to Lembeh to conduct fieldwork for the PhD-project of Maarten, at Curtin University, Perth, Australia. This project focuses on the ecology and socio-economic value of cryptobenthic fauna in Southeast Asia.

After discussions with the dive team we set the following goals for the house reef:

- Create a Fish ID Guide specific for the house reef, to facilitate dive briefings, debriefings and unguided dives.
- Construct a coral nursery, train local staff to maintain the nursery and continue the nursery successfully.

For the PhD-research, the goals we had set for Lembeh were:

- Conduct abundance and diversity surveys for as many black sand sites as possible.
- Collect socio-economic data from visitors, dive guides and dive centre operators.
- Run test project to test feasibility of “Standard Measuring Units for Recruitment of Reef Fish” (SMURFs).
- Document diversity of species emitting fluorescence in Lembeh Strait.

## Methods

### *Fish ID Guide*

During the course of the five weeks, we conducted over 50 dives on the housereef. During each dive, fish were identified and photographed. The first dives were used to explore different habitats and get a general idea of marine life. After multiple roving diver surveys that randomly counted fish, a more targeted approach was used to include all habitats and as wide a variety of fish families as possible. Species were identified using the Tropical Pacific Reef Fish Identification guide (Allen et al. 2007) and Reef Fishes of the East Indies (Allen and Erdmann 2012).

Results were documented in an Excel database and subsequently entered in a Word document to include pictures of each species.

### *Coral Nursery*

A coral nursery pilot project was set up to assess whether this could be a successful method to improve coral health of Lembeh Resorts House Reef & also engage guests in house reef activities and diving. The method was designed using a coral nursery table and concrete plugs to plant the coral. Using epoxy glue small coral fragments can be planted onto the concrete plugs and then placed on the coral nursery table. The table was placed at an ideal depth for turbidity (3-6m) and away from large aggregations of coral predators around reef areas, with the concrete plugs fitting neatly into the mesh on top of the table the small planted coral fragments will stay in this safe environment to grow larger. Depending on species, these corals will be large enough (>15cm) to plant within 3-9 months.

Once corals are ready to plant the bottom half of the concrete plugs are broken off, allowing the main plug part to be safely glued with cement or epoxy onto certain reef areas with a low percentage of coral cover.

#### *Surveys*

7 sites were surveyed (TK1, Air Prang 2, Jahir 1, Air Bajo 3, Slow Poke, Air Bajo 1, Tanderussa), with three dives done per site. We ran a total of 70 belt transects (25m x 2m), 35 at 16m and 35 at 6m.

#### *Socio-Economic Surveys*

Surveys were distributed in eight dive resorts in Lembeh Strait (Divers Lodge Lembeh, Froggies Dive Retreat, Bastianos, Lembeh Resort, Eco Divers, Kungkungan, Lembeh Hills Resort and Black Sand Divers). Subsequent discussions with operators, dive guides and divers completed the socio-economic data.

#### *SMURFs*

We deployed 15 SMURFs, 11 at the house reef and 4 at Air Prang 2. SMURFs were placed and left in the water for varying times (6 days up to 11 days) to gauge efficiency. SMURFs were tested using 5 different substrates: sponge, coral rubble, rubbish, plant debris and sand.

#### *Fluorescence*

On each of the 14 night dives we did, we used high intensity blue LED torches (Sola NightSea) to test for fluorescence. Using different filter and camera set-ups, we photographed as many different species emitting fluorescence as possible.

## Results

#### *Fish ID Guide*

During our dives, we identified a total of 242 species of fish. This diversity is not a surprise, as Lembeh is situated close to the centre of the Coral Triangle. While this is already a high number of species for a small and shallow reef, we are certain that we did not sample the entire fish community and that many more species can be found on the reef. To complete this ID guide, it would be interesting to focus on smaller, cryptic species such as pygmy seahorses and frogfishes, which were not found during our surveys.

#### *Coral Nursery*

Four genera of coral were chosen to plant due to their high growth rate, susceptibility to stress factors and role they play on coral reef ecosystems. All four genera of coral are described as buffer species, in that, they are fast growing corals which are normally some of the first to colonise coral reef areas, quickly increasing biodiversity & biomass over small areas. Due to the difficulty in species ID, identification to only genus level was used. Local staff members were trained in the ID of these four different genera and how to plant and upkeep the coral nursery.

Coral species planted included; *Acropora sp.*, *Stylophora sp.*, *Seriatopora sp.* & *Pocillopora sp.*

Only in 3 months' time will the project be able to be assessed on success by growth & mortality.

#### *Surveys*

Survey data has not been analysed yet due to time restrictions, but a few trends could be noted. Compared to surveys in similar areas in Philippines (Dauin, Southern Negros), Lembeh seems to have a higher diversity of cryptobenthic fauna. On the other hand, the abundance of species found is

considerably lower than what was documented in Dauin. Differences in sites seem to exist, and could potentially be linked to variables such as sediment grain size or temperature, but further analysis is required to clarify these correlations.

#### *Socio-economic surveys*

We collected 34 guest surveys and 12 dive guide survey at Lembeh Resort. Surveys from other resorts will be collected after leaving Lembeh Resort. Data still has to be entered and analysed, but seems to follow the trends seen in Dauin, Philippines. Divers visiting Lembeh are highly experienced, affluent and the vast majority practices underwater photography or videography.

#### *SMURFs*

The SMURF-pilot study showed big differences between deployment near coral reefs (House reef) and black sand sites (Air Prang). This was expected as any form of structure attracts juvenile fishes. Due to the limited sample size, no clear trends in recruitment could be shown between different substrates. Fish mostly found in fish included Apogonidae, Labridae, Pinguipedidae and Scorpaenidae.

#### *Fluorescence*

We documented fluorescence in over 20 species of fish, some of which had not previously been described. It could be of interest to divers and photographers to know which species to look for during fluoro night dives. Scorpaenidae, Muraenidae and Syngnathidae in particular emit strong fluorescence and make for interesting photographic subjects.

## Recommendations for future volunteers

#### *Continuation of coral nursery*

To ensure the success of the coral nursery, it should be cleaned once a week. Once coral are large enough, they can be planted in suitable locations on the house reef. If proven successful, an additional nursery could be built by new volunteers, or additional coral can be placed on the existing nursery.

#### *Completion fish ID guide*

The Fish ID guide has already got many species, but undoubtedly misses certain species that are present on the housereef. Since the guide is a straight-forward Word document, additionally sighted species can easily be added. Nearly all the ID-shots in the guide were taken on the housereef and are therefore not always of ideal quality. If better shots are taken, they can be inserted in the ID guide.

#### *Creating Invert ID guide*

A nice addition to the Fish ID guide would be an invertebrate guide. The housereef is particularly rich in nudibranchs. It would be interesting for guests to have a similar guide documenting the variety of nudibranchs on the site.

#### *Consolidation of house reef structures*

The different structures on the housereef are not always placed in ideal locations and are rather far spread out. This does not always make for an aesthetically pleasing dive, especially the section with discarded water dispensers. We suggest moving the majority of structures (water dispensers and biorock structures) deeper, to the sandy area near the fishing nets, creating one large artificial reef,

versus different objects randomly dispersed over the reef. The reef balls and fish houses are more successful, having good growth so it would be advisable not to move these.