

Component 2 (Biodiversity): Philippines

Report on the activities of the Component 2 (Biodiversity team) in the Philippines

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The coast of Southeast Asia is home to a tremendous biodiversity based on high primary production, which in turn provides an important basis to local livelihoods in various ways. The goal of the Component 2 (Biodiversity team) is to clarify the species- and within-species-level diversity of coastal organisms in Southeast Asia, thereby offering key information for evaluating the ecosystem health in the area. For this purpose, we have been working on the following topics in the Philippines.

Field guide. A field guide to commercial fishes in the Panay Island, the Philippines is now under preparation. We have so far collected over 1300 specimens including at least 300 species. These specimens have been deposited in the Ichthyological Collection of the UPV Museum of Natural Sciences (UPVMI) after being photographed, tagged and tissues being taken for genetic analysis. We are going to incorporate DNA barcoding information in the field guide as noted below.

DNA Barcoding. DNA barcoding utilizes a Cytochrome Oxidase I gene (COI) sequence of mitochondrial DNA (mtDNA) as a barcode to identify species, facilitating fast and accurate species identification for all potential users. Our goal is to construct a reliable database of DNA barcode of the commercial fishes of the Panay Island for species identification. A prerequisite for such a database is that the specimens on which the database is made are correctly identified on the basis of morphological characters prior to barcoding. Therefore, we use those specimens collected for the field guide, being identified by experienced taxonomists and deposited in the museum as voucher. This in turn provide a cross-reference between the DNA barcode database and the field guide mediated by the voucher specimens, which, to our knowledge, is unprecedented for fishes.

As of Sep. 2014, about 200 fish specimens have been subjected to DNA sequencing, generating CO1 sequences of 107 species representing 50 families. Part of these sequences have been submitted to Barcode of Life Database (BOLD), forming a project “Market fishes of the Panay Island, Philippines”. All other sequences shall eventually be submitted to the project associated with voucher numbers of specimens and associated information.

The Philippines team conducted four fish diversity collection in Batan Bay. At least 90 species belonging 40 families were recorded, documented and deposited at the UPV Museum of Natural Sciences.

Genetic population structure. It is widely accepted that deciphering intraspecific genetic diversity and its geographical distribution pattern is the most important aspect of biodiversity study, because each population represents a fundamental conservation unit that needs to be managed separately for sustainable use. In addition, based on these information we can infer the historical process in which the present diversity of the species has been shaped, which is central to evolutionary biology.

We selected ca. 20 commercially important coastal fish species to be subjected to such a study. Specimens are collected from four localities facing the South China Sea. Genetic differentiation among localities and several other aspect of intraspecific genetic diversity were examined using the sequences of mtDNA COI and Cytochrome b (Cytb) genes for each species. In addition, for a subset of target species we have obtained a source data to be used to develop novel primers for microsatellite markers using Next Generation Sequencing. For details, please see “Report on the activities of the Component 2 (Biodiversity team) in Thailand”.

Other activities. We are trying to describe the morphology of juvenile *Thunnus* spp. from the Panay Island, and thereby find effective keys to the species for accurate identification. Several tens of specimens have been so far collected and their morphology examined.

Initial discussions with fisheries scientists at Aklan State University were made to conduct a training activity on fish collection, preparation, and preservation. This training, which shall be conducted by Philippine RIHN Biodiversity group, seeks to transfer capability to local scientists. This is part of the overall objectives of the RIHN’s CACE Project.

The Philippines team has also started looking at the freshwater biodiversity of Antique, located near the northwest portion of the Panay Island. Preliminary results will soon be presented as a form of two posters. In addition, an effort is currently being made to get additional funds from UPV, which shall be dedicated to further study in that area.

Expected final outcomes. The final outcome of our activity in the Philippines shall include 1) a series of individual papers of genetic or taxonomic studies (see Appendix below), 2) a review

paper on the origin of coastal marine fish diversity in the South China Sea, synthesizing the results of individual papers, 3) DNA barcode database of commercial fishes of Panay Island, utilizing the BOLD system, 4) the field guide of the fishes of Panay Island, and 5) enhanced capability of local scientists in Batan area on biodiversity research and conservation activities.

Appendix : Expected papers from genetic, morphological or taxonomic studies.

- Population structure of *Atule mate*
- Population structure of *Megalaspis cordyla*
- Population structure of *Gerres filamentosus*
- Population structure of *Terapon jarbua*
- Population structure of *Selar crumenophthalmus*
- Population structure of *Gerres oyena*
- Population structure of *Lutjanus vitta*
- Population structure of *Scolopsis taenioptera*
- Population structure of *Decapterus macrosoma*
- Population structure of *Decapterus macarrelus*
- Population structure of *Scolopsis monogramma*
- Population structure of *Priacanthus tayenus*
- Population structure of *Upeneus guttatus*
- Population structure of *Priacanthus macracanthus*
- Population structure of *Stolephorus indicus*
- Population structure of *Sphyraena putnamae*
- Genetic and morphological differentiation within genus *Rastrelliger*
- Species composition and relative abundance of *Thunnus* spp. in the waters of the Philippines.
- Identification of *Thunnus* spp. using multiplex species specific PCR
- Identification of commercial canned tuna (tribe Thunnini) using molecular technique.
- Taxonomic review of the genus *Rastrelliger*
- Morphological description of juvenile *Thunnus* spp.