Marine mammal conservation: DNA based approaches to studying biodiversity of selected dolphin species in Malaysia

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As the world undergoes growth and development, many populations of coastal marine mammals face serious threats ranging from unregulated fishing practices to declining habitat space due to anthropogenic activites and pollution. The survivability and population health of these mammals require close monitoring, and intervention measures may need to be implemented to ensure species conservation. IUCN had recognized the need to conserve genetic diversity as one of three global conservation priorities.

The monitoring of the endangered dolphin populations is commonly done through boat transect surveys by patrolling the area of dolphin habitation. More recently, however, molecular analysis has been gaining popularity as a conservation tool in monitoring the population of endangered species. Molecular analysis can show species resolution, effective population sizes, social structure, and genetic variability of a population.

In this paper we report our initial attempts to use molecular genetic approaches to study the population structure of two species of dolphins, Orcaella brevirostris and Sousa chinensis, in the Bay of Brunei, and the coastal waters of Matang, Perak. The D-loop region of the dolphin mitochondrial genome (mtDNA) was sequenced and analyzed to determine whether there is sufficient variability for species and individual identification. The ZFXY system of the sex chromosomes were used to determine the sex of the collected dolphin samples. Fragment analysis of five co-dominant, multi-allelic microsatellite markers (MK3, MK5, MK6, MK8, and MK9) was done to investigate its variability, which would be useful for studying the genetic structure of the dolphin population as well as facilitating individual and familial structures observations.

More recently, we have begun using the environmental DNA (eDNA) based approaches to study fish diversity which may provide crucial information of species richness that could, in turn, influence the food web and overall marine mammal ecosystem.

Keywords: genetics, microsatellite, D-Loop, eDNA, environmental DNA