The Role of Habitat Heterogeneity on MPA Design

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Marine coastal ecosystems such as mangroves, seagrass, and coral reefs have shown important habitats for marine organisms especially for fishes. The reason for this importance is because these habitats are known to have a good source of food, shelter against predators, often cover extensive areas and may intercept planktonic fish larvae (Nagelkerken et al., 2000; Mumby, 2006; Unsworth et al., 2009).

However, these ecosystems have been reported to be in an alarming degradation according from the researches done in the past. This degradation was told to be the effects of natural phenomenon such as climate change, but most were from the influence of human population that lives on or near coastline and also recently tourism. Due to this, marine ecosystems were subjected to overexploitation and exposed to pollution therefore affecting the natural resources linked to mankind (Andre DeGeorges et al., 2010; Jackson et al., 2001).

Marine Protected Area or MPA is a marine resource management tool established to help protect the significant natural and cultural resources found within the marine environment. This protective measure is done to ensure the sustainability of benefits these marine ecosystems provide from present to future generations. According to IUCN, MPA is defined as "*a clearly defined geographic space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values.*" Worldwide, MPAs are established according to various objectives and different categories depending on local location.

In the Kuroshio Region which is influenced by the Kuroshio Current that supplies the marine resources from Philippines to Taiwan and Japan, consists a complex mosaic of interacting ecosystems. This complexity is sometimes a mixture of seagrass-corals, mangrove-corals, mangroves-seagrass or a combination of the three (mangrove-seagrass-corals) leading to a random seascape setting like fragmented or connected habitats. These fragmentation and connectivity could result to a completely different ecological function or role which in turn provides unique and significant influences on the structure of marine organisms such as fishes (Honda et al., 2013; Layman et al., 2004). Due to this, important ecological linkages between these complex ecosystems is vital in the planning process of managing fisheries resources and designing marine protected areas.

Some established MPAs in the Kuroshio Region, specifically in the Philippines, are poorly designed and planned. Some were established for the sake of accomplishment, without any baseline information on ecosystem's ecological function and involvement of some important key stakeholders. There have been studies that the major role or function and the seascape heterogeneity of habitats should be considered in future MPA design (Giakoumi and Kokkoris, 2013; Hungtington et al., 2010). Therefore, participation of academic institutions or those that are knowledgeable on the ecological aspects of ecosystems is crucial. Through this way, a holistic approach in designing MPA is achieved.

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