学 位 論 文 内 容 の 要 旨

博士 (環境科学)　　氏 名　ヤシル ハヤ ラ オデ ムハンマド

学 位 論 文 題 名

Assessment of coral reef degradation and the economic loss
in the Pangkajene and Kepulauan Regency, Spermonde Archipelago, Indonesia
(インドネシア・スペルモンデ諸島パンカジェネ・ケプラウワン県における
サンゴ礁の劣化及びその経済損失の評価)

Destruction of coral reefs at global scale stays at an alarming rate for decades due to multiple stressors. There is no exception for coral reefs in the Pangkajene and Kepulauan (PANGKEP) Regency in the Spermonde Archipelago, Indonesia which is located in the Indo-Pacific Coral Triangle. They have been under the stresses caused by various harmful impacts. Since human activities, as well as natural disturbances, posed major threats to the coral reefs, these livelihoods may also be at risk. Currently, no comprehensive information on the status and condition of coral reefs in this area is available for this resource management.

This research was conducted to identify the extent of coral damage by using remote sensing and in-situ measurement data to analyze the changes in coral reefs. This study was determined the changes in coral habitats over a period of 20 years from 1994 to 2014 using multi-temporal Land Satellite (Landsat) image data substantiated with in-situ measurement data collected in 2014. The results show that there has been a decline in live coral cover for 20 years, from 7,716 ha in 1994 to 4,236 ha in 2014, with a degradation rate of 174 ha/yr. The ratio of the coral cover in the coral reef transects varied from averagely 24% for live corals to 96% for coral rubbles. The decline in live coral habitats is considered to be caused mainly by destructive

fishing practice, followed by excessive total suspended solids in surface waters.

The total economic values of coral reefs in the study area were also estimated by the sum of the direct use, non-use, and existence values. The total economic value in 2014 was estimated to be USD 12 billion or 3 million USD/ha, which were related to fisheries, tourism, recreation, research, coastal protection, existence value and bequest value. While the total economic value is considered to be still high, this study indicates that the value has been lost by USD 1 billion or 50 million USD/yr for the 20 years since 1994. The economic loss was resulting from loss values of coral reefs, including economic losses of fisheries (i.e., coral fishes, crabs, squids, octopuses and seaweeds), tourism, recreation, and coastal protection. The economic loss of coral reefs is anticipated to continue in future. Therefore, in order to save coral reef ecosystems, the local governments of the PANGKEP Regency need to develop and implement the comprehensive strategic policies, to take protective measures of coral reefs such as by designing new marine protected areas (MPAs).