

## F-2 A Study on Monitoring Ecosystem Dynamics in Wetland Areas in Asian Pacific Region (Final Report)

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Since environmental changes in wetlands are now getting serious due to human activities, it is important to monitor wetland environment changes from physical and biological viewpoints to protect them from destruction. The objectives of this study are to monitor wetland ecosystems and to evaluate the effects of wetland environment changes on wetland creatures especially on migratory birds. This study consists of three sub-programs, whose main results are given below.

### (1) Monitoring and mapping of wetland with remote sensing

This project investigates new techniques for wetland monitoring using remotely sensed images, with a special emphasis on wetland vegetation mapping. There are 3 major original contributions in this thesis: First is the development of new spectral indices, such as perpendicular vegetation index, water turbidity index, and vegetation-soil-water index, that can be used to monitor the vegetation, water, and soil conditions in wetland areas. Second is the development of a new unmixing method called the subspace method. Third is the development of a new classification method using multi-temporal satellite images.

### (2) Study on the mechanism of the population decline of long-distance migratory birds in Japan

In order to show the population trend of forest and wetland summer visitors to Japan, field observations, literature surveys, and questionnaire surveys were conducted in 1995-1997. Field observations and literature surveys showed that the number of seven species of summer visitors drastically declined in some areas of Japan: Black Paradise Flycatchers *Terpsiphone atricaudata*, Ashy Minivets *Pericrocotus divaricatus*, Yellow-breasted Buntings *Emberiza aureola*, Ruddy Kingfishers *Halcyon coromanda*, Brown Hawk Owls *Ninox scutulata*, Jungle Nightjars *Caprimulgus indicus*, and Porzana Crakes *Porzana fusca*.

### (3) Study on identifying important bird areas and a database system to analyze the important bird areas

Important bird areas were identified in the Philippines and in Maluku islands in Indonesia by using a geographic information system and locality data of threatened species. Categories for identification of important bird areas are made through discussion and reviewing by ornithological experts from BirdLife Partner organizations. Most of the locations are identified in forest areas and major threats to these habitats are deforestation and cultivation.