F-5 Biodiversity on coral reefs and its conservation(Final Report)

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1.1 In coral reef, coral and boring benthos are making very various habitat, then different fish community had high species diversity cloud exist in each habitat, also many species of borehole users could live in various holes. It is considered that more species can coexist not only microhabitat segregation but also partition of food resources.

1.2 The coral coverage was 5.1-89.8 %, in which totals ranging from 31 to 132 species were recorded. The species richness increased from the coastal side to the reef margin through the reef flat, and began to decline below the middle reef slope.

1.3 ITS region of rRNA gene was useful for phylogenetic study of corals at generic levels. ITS1 sequences of zooxanthellae, however, did not have enough information: most sequences formed an unresolved cluster. SSCP studies of LSUrRNA gene showed that a coral colony contained zooxanthellae of 2-3 genotypes. An active form mariner with a complete ORF for transposase was found in *Fungia* sp.

2.1 The monitoring method to estimate the healthiness of coral communities was developed by using the polychaete faunal composition of sandy bottom closely associated with the coral communities. The faunal compositions of samples showed the high possibility of usefulness of polychaete species as good bio-indicators for monitoring of environments around coral communities.

2.2 The monitoring method of temperature and salinity was developed to detect circulation in coral reefs. The freshwater discharge from the land was estimated by this method, and measurements of CO_2 system parameters and nutrients showed potential influence of terrestrial inputs on the carbon budget of a fringing coral reef of Ishigaki Island. Terrestrial inputs deliver a large quantity of C relative to P, resulting in the unique stoichiometric condition for carbon processes.

3.1 The algorithm for detecting long-term variation of coral reef was developed from LANDSAT-TM images. The spatial and time domain anomaly of logarithm of pixel value is good for correction of air condition, sun angle, and tidal level change. The most weighty variation around Ishigakizima Island was related to the coral bleaching arose in 1998.

3.2 Aerial photographs of coral reefs were taken by a digital camera suspended in a small remote-controlled helicopter at the Sekisei Lagoon, Okinawa. In order to analyze digitized image, coverage of coral community was surveyed using quadrat method. High ratio of standard deviation on gray value of image indicates law coral coverage. It is sug gested that dominated algal cover occurs image flare resulting high sd ratio.

3.3 Methods to make stereoscopic image archive were developed to record and analyze the processes that the growth of corals generates the secondary habitats, which related the biodiversity of coral reefs. This archive showed the importance of 3-dimensional spatial factors acting on the growth, competition, destruction and deteriorations of coral reef such as bleaching of corals.