DEVELOPMENT OF REFORESTATION TECHNIQUE FOR REHABILITATING MANGROVE ECOSYSTEM'S, PROJECT CHARACTERISTICS OF MANGROVE CARBON -

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With the objective of reducing GHG gas, specially CO2, prior to the entitled project, the Australian Institute of Marine Science (AIMS), the Kansai Electric Power Co., Inc. (KANSAI) and the Kansai Environmental Engineering Center Co., Ltd. (KEEC) had jointly worked from April 1996 for 4 years, to study on 'CO2 fixation and storage in coastal ecosystems'. In last two years of the project, the Royal Forest Department (RFD) had also participated in the project conducted at Chumphon where situated in the Gulf of Thailand. From the project, mangrove ecosystem is found to specially play an important role in fixing and storing atmospheric CO2, showed as greatest carbon reservoir in the coastal area. Therefore, we were convinced that we could assist to cope with global warming problem through mangrove rehabilitation. The result indicate details following

1. Carbon storage and carbon characteristics of mangrove

Mangrove ecosystem has greater carbon storage capacity than other ecosystem, which is characterized by their huge carbon content in the belowground. In Chumphon 1,208 ton C/ha was stored in the sediment having the depth of 8.5 meters. Carbon accumulation rate also is greater in mangrove ecosystem. The below table indicates carbon accumulation rate measured in the 5 different mangrove (*Rhizophora apiculata*) plantation sites in Chumphon. Comparing to phytoplankton, mangrove has a higher accumulation rate.

Carbon accumlation rates in mangrove plantation sites

	Accumlation rate (ton C/ha x year)
Mangrove plantation	
Aboveground	3.2 - 5.3
Belowground	0.7 - 1.5
Total	3.9 - 6.8
Phytoplankton	0.97

Organic carbons differs in their quality depend on where soil exist and how soil was formed. Mangrove has very different characteristics in terms of organic carbon, which is mangrove soils are abundant of aliphatic compounds and less carboxyl compounds as functional group. Aliphatic compound holds long-chain in their structure. Due to this characteristic, mangrove soil has a great absorbing capacity. Aliphatic compound also can be effective of absorbing toxicant chemicals. From the experiment using herbicide, mangrove showed a strong absorbing capacity. Even though this aspect of mangrove is not examined clearly, it is speculated mangrove may be acting as a buffer against ocean pollution.

Since we found that mangrove ecosystem plays an important role in terms of carbon among coastal ecosystem, we stepped in the stage of rehabilitating degraded mangrove. Followings are some of results we obtained in the present project.

2. Soil conditioner treatment in abandoned shrimp farm

Mangrove recovery gets more difficult in the abandonment of intensive shrimp farms. Since they are heavily deteriorated from the initial condition, restoring ecosystem is not easy in many of cases. In the application of different types of soil conditioner such as coconut fiber, charcoal, shell and shrimp waste, coconut fiber among all showed a good effect in initial growth of planted mangroves. Since soils we studied have heavy clay texture, coconut fiber could have improved soil physical condition by having more space for air and water surrounding the roots.

3. Learning from local knowledge

Understanding social and economic conditions of the local community is important for conservation of mangroves. Without a promising plan that makes a balance between mangrove conservation and improvement of local people's living standard, successful mangrove plantation would never be attained. Traditional crab/shrimp/fish cultivation pond is being operated in Nakon Sri Thammarat, Thailand. The pond has mangrove area in the middle of the pond. Mangrove area provides nursery for benthos, which is important part of food chain leading a feed for crab/shrimp/fish. This pond indicates key factor of why and how two different land use, mangrove and shrimp/crab cultivation, coexist in economically and ecologically affordable manner.