

Goals:

- To assess transport and chemical transformations of air pollutants over the East Asian continent and the western North Pacific
- To determine the deposition of primary and secondary pollutants in the East Asian region
- To estimate the effects of climate and atmospheric

processes on marine biogeochemistry

Tasks:

- Emission inventory
- Intensive field programs
- Ground-surface monitoring network
- Shipboard measurements

Evaluation of carrying capacity in coastal waters

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The 20th century has been the age of the throwaway principle and competition. Consumption has been encouraged in pursuit of material wealth, and this has been supported by our increasing ability to produce industrially anything we want including food. This leads to an escalating demand of materials and energy for further production. On the contrary, little attention has been paid to thrown-away materials. Until quite recently, we did not recognize the cost for managing the waste product. By this, we have exerted huge impacts on the natural environment and its material cycling through extracting things from nature and depositing waste materials far beyond nature's renewing ability. Competition for profits at various levels accelerates this tendency. Now, we are in serious dilemma in many environmental issues among environments, population and resources viz., deterioration in environments, explosion in human population and exhaustion of resources. Recently, it became widely recognized that a proper environment is essential to sustain renewable resources, and that there are practical and moral reasons for placing values on the environment, including utilitarian, aesthetics, the rights of nonhuman life and our obligations to future generations. Moreover, benefits of natural environments are evaluated in terms of 1) goods such as food production, 2) ecosystem services such as material cycling and purging function, and 3) amenity.

Coastal waters have been utilized in various ways, and food

production is the most important function. Coastal areas are nurseries for marine biota of which conservation is crucial for sustainability of fish stock. Changes in coastal environments due to reclamation, pollution and heavy eutrophication directly affect the fishery stock through reduced reproduction of organisms. Coastal waters are also intensively utilized for sea farming and aquaculture of fish, shellfish and macroalgae. Since cultured organisms are incorporated into natural material cycling within the coastal ecosystems, excessive aquaculture can lead to disturbance in the material cycling and marine life. In addition, various environmental issues are raised, being associated with habitat modification, wild seedstock reduction, biological pollution and formation of anoxic zone. Sustainable utilization of coastal waters including continued expansion of aquaculture requires healthy ecosystems because of dependence of fish production on natural ecosystems. Then, how much food production can we expect in a coastal area? To answer this question we have to evaluate the carrying capacity of the area through understandings of *in situ* material cycling. A research project on the carrying capacity of coastal waters is currently in progress in Sanriku area in northern Japan in order to establish adequate aquaculture potential for shellfish and macroalgae. Recent progress made in these areas will be reviewed.

Coastal ecology and marine pollution

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Humankind had regarded capacity of the hydrosphere as unlimited at the beginning of the 20th century because of its huge surface (two third of surface of the earth). During the 20th century, agriculture, fisheries, forestry, mining and industry are making rapid progress with accompanying pollution.

The world population is expected to increase from 5.9 billion in 1998 to 8.0 billion by 2025. It is estimated that 75% of the global population lives on the coast or within 60 km of the coast by the year 2000 and the percentage is increasing. These population have direct or indirect impacts on environments of