Program for Impact and Risk Assessment

Major Research Results

Impacts on Forests and Vegetation

Among the changes in potential vegetation in Japan, it is predicted that a decline in the distribution of alpine vegetation and sub-alpine coniferous forests will occur by 2050. There is also a risk that northern coniferous forests will be replaced by broad-leaved deciduous forests, and that southern broad-leaved deciduous forests will be replaced by broad-leaved evergreen forests, as depicted in Fig. 10. This figure also shows a marked reduction in mountain ecosystems with a northward shift in the vegetation zone for the main islands of Japan.

Impact on Agriculture and Food Security

In Japan, approximately 1.7 million ha of paddies provide about 9 million tons of rice in recent years, but a change in temperature would affect this productivity. Roughly, rice production will increase in high latitudes and decrease in low latitudes due to differences in growth and development efficiency. If the same cultivars are introduced in the future, it will be necessary to grow rice earlier in the Tohoku and Hokkaido regions, the northern parts of Japan, and later in the other regions to maintain current yield levels.

As the Japanese diet has been westernized since the high economic growth period of the 1960s, the yield from domestic agricultural production continues to decrease with a rapid increase of food imports. As a result, the food self sufficiency in calories has dropped to about 40%. Japan depends on imports from abroad for feed crops such as wheat and soybeans, which makes the country extremely vulnerable to impacts of climate change on the producing country.

Heightened Health Risks

Rising temperatures will directly impact human health, with an increased overall death rate from heat stroke and other disorders. Elderly and people with underlying medical conditions will be at greatest risk. Worsening atmospheric pollution and epidemics of vector-borne infectious diseases, such as malaria and dengue, are also possibilities. There have been recent reports of mosquitoes that transmit communicable diseases moving northward to the Tohoku region, and the risk of infectious disease may become a reality as the mosquito habitat expands. However, social aspects play a greater role in the stress that healthy people feel in daily life and work, as well as in the chronic diseases.
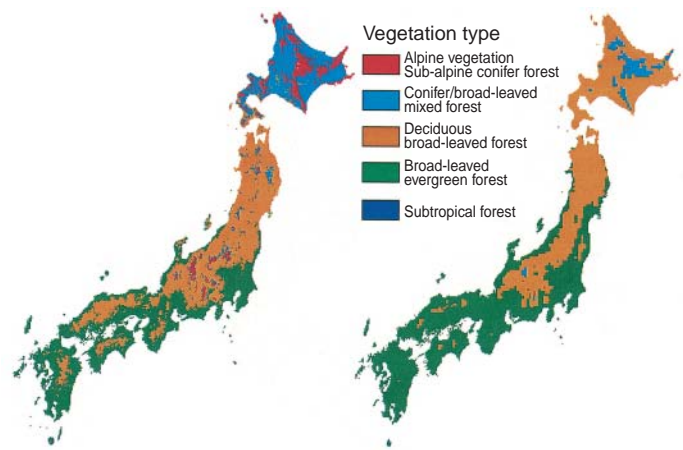

Fig. 10. Predicted changes in natural vegetation in 2050. The Left figure shows the distribution of potential natural vegetation at present, and the right one shows that for 2050 climate predicted for CCSR-98 scenario.

Future Research Directions

Research continues to clarify the impacts of global warming in an extremely broad range of areas. Table 1 lists the distribution of research activities to date. Numerous results have been obtained for terrestrial ecosystems; the agriculture, forestry, and fisheries industries; and coastal zones compared with other fields.

In impact and risk studies, a wide range of research is needed, including detection of emerging impacts, impacts on individual sectors, nationwide assessments, identification of thresholds of impacts and vulnerable areas, and adaptation strategies and measures. Many of the studies to date focused on fundamental aspects, such as methods of predicting the impact. However, to tie these with countermeasures against global warming, we need clear answers to the following questions.

✔ What extent (e.g., number of people at risk and monetary amount to be lost) will these impacts reach on a national scale?

✔ Which sectors in which regions will sustain the severest impacts?

✔ Threshold of impacts - How many degrees can the surface temperature rise, and how many centimeters can sea levels rise, before the world will have intolerable impacts?

✔ When will these occur?

Table 1. Map of impact/risk studies

	Water resources Water environment	Terrestrial ecosystem	Agriculture, forestry and fishery	Ocean environment	Coastal zones	Land preservation, disaster prevention, and human settlement	Industry Energy	Human health
Impact detection		●●●		●●	●			●
Element studies on assessment methodology	●●	●●●	●●●	●	●●●	●●	●	●●●
National assessment Impact map	●	●●●	●●●		●●●	●		●
Threshold of impacts Vulnerable sectors and areas Economic assessment	●	●●	●●	●●	●●		●	●●
Adaptation	●		●●	●	●	●	●	
Impacts on the Asia and Pacific region	●	●●	●●		●●			●

●●● : Studies with results in most areas　　●● : Studies with results in some areas　　● : Studies in limited areas　　None : No studies or unknown situations