

(4) Overseas situations

1) The outline of "problems in the natural environment with regard to plants" in the world.

At the United Nations Conference on Environment and Development held in June, 1992, at Rio De Janeiro, Brazil, the Convention of Biological Diversity as well as "principles concerning forests," which stipulated the strengthening of maintenance and sustainable management of the diversified functions of forests. But even after that, the environmental problems of global scale have not necessarily been changed for the better. With growing population, enhanced economic activities, and so on, forests of the world, such as rain forests, are being destroyed continuously, and soil deterioration is making sustainable use of farmland impossible.

Furthermore, as a result of ongoing globalization living species are moving out of their conventional distribution areas and giving serious impact on ecosystems. There are many species in the world today that have gone extinct or faced with extinction.

Additionally, wars and disputes are also giving adverse impact on the natural environment not only in the countries directly

involved with the war but also in neighboring countries as well as at the downstream of rivers flowing into these troubled areas. There is also a situation where war refugees are being forced to exploit the natural environment excessively for their survival.

On the other hand, at the third session of the conference of the parties to the Framework Convention of Climate Change (COP3) held in 1997, afforestation was recognized as a means of absorbing gasses causing greenhouse effect. In this regard, overseas, afforestation is seen as a project of international cooperation to reduce carbon dioxide, as in the cases of Emission Trading, Joint Implementation, and Clean Development Mechanism CDM and so on.

2) The outline of environmental problems in each region of the world

① Asia and Pacific regions

Due to the high density of population, and the rapid economic growth, and industrialization, the environment is expected to be further disrupted in the future, which would cause forests (rainforest, mangroves) and the diversity of ecosystem to decline along with the spread of environmental contamination.

② West Asian region

The most urgent problems in this region are the deterioration of water sources and the land. Excessive pasturage in essentially frail ecosystem is ruining the pasture of this area. In addition, draught, intensive farming, poor irrigation technologies and uncontrolled urbanization are also giving adverse effects on the environment.

③ European and Central Asian region

In the western European region, by the measures to suppress environmental deterioration, some of the environmental problems have remarkably been improved. But air pollution in cities due to exhaust gas from automobiles remains. In the central Asian region, shrinking of industrial activity due to political changes has resulted in a lesser burden on the environment.

④ African region

Poverty is the main factor contributing to and also the result of the deteriorating environment, which is threatening this area. Main problems are: forest destruction, soil deterioration, desertification, decline in biological diversity, water shortage, water and air pollution. There are also newly emerged urban problems, disrupting the environment and people's health as seen in other cities throughout the world. In many countries, the cost of measures

to deal with these problems is thought to become much bigger than what is needed for preventive measures.

⑤ Latin America and Caribbean countries

There are two major environmental problems standing out in this region. One is the urban environmental problem. In this region, three fourths of the population live in the city, and in many of these big cities, air pollution is threatening people's health with water constantly in short supply. Another problem is depletion and destruction of the forest source of the Amazon area, which is threatening biological diversity. In this region, there is the world's largest cultivable land but many of them are in critical condition due to soil deterioration. On the other hand, many of the countries in this region are potentially capable of reducing gasses causing greenhouse effect by such measures as supplying regenerative energies, conserving forests, and afforestation that would serve as an important source to absorb carbon dioxide.

⑥ North American region

A resident of North America uses more energy and natural resources than a resident of any region of the world, and this is causing serious problems to the environment and people's health. Due to strict regulations and improvement

in management systems, the impact on environment has successfully been lessened. But there are still problems of people having been exposed to agricultural chemicals, organic contaminating substances, and poisonous compounds, and biological diversity threatened by the introduction of non-native species.

3) Japan's cooperation to international environment

① Measures taken by government organizations

A. JICA (Incorporated Administrative Agency, Japan International Cooperation Agency)

<http://www.jica.go.jp/Index-j.html>

Japan International Cooperation Agency, which is a government organization, is carrying out activities using ODA (official development assistance.) JICA's activities cover a wide area, including agriculture, industry, and education. They are also actively engaged in activities related to natural environment such as afforestation.

B. Japan Bank for International Cooperation

<http://www.jbic.go.jp/>

The bank is giving assistance in the form of a comprehensive afforestation in the Republic of Tunisia using yen credit contract. In the Republic of Tunisia, in order to cope with dwindling forest area and desertification, a comprehensive afforestation is under way, which is aimed at sustainable

utilization of forest sources, improving socio-economic conditions of the local residents, conserving ecosystem, water, and land.

C. Incorporated administrative agency, New Energy and Industrial Technology Development Organization (NEDO)
<http://www.nedo.go.jp/>

Under the theme of the international joint study advance research, in Thailand, for an example, they are engaged in a research on the technology of appropriate purification of contaminated soil in the Eastern Asia region. In this research, experiment on purification of contaminated soil (fight remediation) is being conducted using plants particular to Thailand, which have been obtained from the Asia Institute of Technology.

② Measures taken by NGOs and NPOs

In the area of providing environmental assistance overseas, NGOs and NPOs are actively engaged in various undertakings using funds collected from citizens and grants from the government and private corporations. The range of their activities covers a wide area, encompassing education, living, and environment, and that these are characterized as grass roots type of activities, taking care of areas out of reach of the government. They are also active in undertakings related to conservation of the natural environment, which include

conservation of living environment and afforestation activities.

③ Measures taken by private corporations

Among activities to support environment by private corporations are: social contribution activity (contribution to environment), which is not directly related to corporate activities, afforestation for stable acquirement of production material by paper manufacturing companies and the like, afforestation taking into account emission trading of carbon dioxide (industrial afforestation), and activities using the company's own system facilities for greening.

A. Industrial afforestation (Japan Overseas Plantation Center for Pulpwood, corporation): <http://www.jopp.or.jp/>)

Industrial afforestation means an afforestation aimed at procuring materials for industrial production, and in the case of paper manufacturing companies, they are doing industrial afforestation for stable supply of high quality woodchips to make papers. Recently, energy industries, such as electric power and automobile industry are increasingly participating in the industrial afforestation, which is an indication that absorbing carbon dioxide by forests is well understood as one of the effective measures to prevent global

warming.

B. Development of plant system

For instance, Mitsubishi Heavy Industry is working on building a demonstration plant in the desert area along the coast of the Red Sea in Saudi Arabia to make a green zone of 50 square kilometers, aiming at "sustainable greening of desert." First, a simulation was done to find out how the precipitation would be affected by greening deserts. It was discovered then that when a desert has been greened up to a certain extent, the forest attracts clouds and rain would fall. Until clouds come, the way to reuse water thoroughly must be worked out by turning seawater into freshwater, using recycled energies, such as solar and wind power generations. By enlarging the green area this way, the natural mechanism becomes activated, thereby constructing a system that would green the desert.

<http://www.mhi.co.jp/fla.html>

<http://eco.goo.ne.jp/business/csr/ecologue/wave30.html>

4) Technologies concerning environmental assistance

① Technologies concerning forest conservation and afforestation

A. Mixed afforestation (Green Earth Network

<http://homepage3.nifty.com/gentree/index.html>)

This is a technology to make and maintain a healthy forest

by mixed afforestation, as a forest planted with single specie of tree is vulnerable to damage by blight and harmful insects. In 1997, a research on dead pine trees revealed that there was less damage where two kinds of pine trees (Scotch Pine and Chinese Pine) were planted, and damage was even less among those growing in poplar and sage.

B. Use of microorganisms in the soil

(Green Earth Network
<http://homepage3.nifty.com/gentree/index.html>)

Mycorrhiza fungus is part of the mushroom group, which coexist with plant roots. While they absorb nutrients from the plant as a form of sugar, they help the plant absorb water and minerals from the soil. Mushrooms growing in a forest where there is a same kind of tree as the seedlings to be planted are collected, rinsed with water and the water containing spores of the mushroom is poured over the seedlings. There is another method of mixing topsoil from such forest with the soil of a seedling field.

② Technology concerning greening of desert

A. Making environment conservation and agro forestry (agricultural forest management) compatible

The importance of greening and afforestation is discussed thoroughly with the government of the country, experts, and ordinary people (nomads?), and after their intentions have been unified, method of greening would be decided based on

minute researches to be conducted. The method is to first build a windbreak forest and clear the inside where pasture, fruit trees, and agricultural crops are cultivated. By making environment conservation and agro forestry (agricultural forest management) compatible, the life of local people can be enhanced.

B. Greening as "farm land" and "pasture"

(Green Earth Club: <http://www.ryokukaclub.com/>)

Friends of Earth Japan: <http://www.forejapan.org/>

Afforestation and making forest near a water source can force the poor local residents to lose a source of income. Afforestation should be of a windbreak forest only and greening such as making farmland to produce high value added crops and pastures should be promoted.

C. Greening simulation with Earth Simulator

(Mitsubishi Heavy Industries, Frontier Research Center for Global Change, Kyoto University, National Research Institute for Earth Science and Disaster Prevention, University of Tottori, Sophia University: <http://eco.goo.ne.jp/business/csr/ecologue/wave30.html>)

This simulates how the precipitation would change by greening the desert area. When greening has proceeded to a certain level, it was discovered that the forest invites clouds which bring

about rain = "sustainable greening of desert"

**D. Mixed afforestation (Friends of Earth Japan:
<http://www.foejapan.org/>)**

A forest can be totally destroyed by blight and harmful insects if planted with single specie. By mixing trees of different characters, trees would help each other and grow healthy.

**E. Greening with hemp (Hemp Product Spread Association:
<http://www.partie.net/hpsa/>)**

Hemp has an extraordinary growth power. They can be cultivated repeatedly even in infertile land without absorbing too much nutrients from the land, making chemical fertilizers and insecticide unnecessary. Furthermore, as they can also mend the soil, fertility of the land can be restored by planting hemp, which is followed by tree afforestation. Additionally, hemp seeds can become food while yarn can be made from the skin of the stem, which enable farmers to collect some earnings besides greening the desert.

**F. Unit afforestation (G-Net:
<http://www.green-network.org/>)**

A unit is similar to a grid of checkerboard. This is the method of making a multi-layered forest by planting tall trees outside the frame of the unit and planting shrubs (low trees) native

to the region inside. The afforestation of this method is also highly effective as a windbreak or sand break forest, also good for forming a healthy ecosystem strong against forest management and harmful insects. As the area is enlarged by adding one unit by one unit, forest enlargement and the installation of work roads and shrubs are easily done.

G. Use of grass squares

(The Japan Association for Greening Deserts,
<http://www.sabakuryokuka.org/>,
<http://www.ryokukaclub.com/>)

In order to stop the moving of sand in desert, as a preliminary step to the afforestation of sand dune areas, straws are laid in meshes of net in a size of one-meter square so that the sand is not swept away by the wind. When inserting straws, pasture seeds are also buried into the land. Although a grass square itself becomes ineffective in five to six years, dissolved by microorganism, it can serve as manure for pasture seeds and their roots can help them maintain the effect of a grass square.

H. Use of water absorption polymer (moisturizing agent)

(The Japan Association for Greening Deserts
<http://www.sabakuryokuka.org/>)

Before planting a tree, the root of the seedling is soaked in

the water mixed with absorption polymer. This would ensure its steady growth even with little water.

I. Use of microorganisms in the soil, partial water cultivation

(Petroleum Energy Center, foundation, Kansai Sogo Technos, <http://www.kanso.co.jp/>)

Even under the severe condition of a desert, trees can be reared same as when chemical fertilizers and soil improvement agent are used by raising them with compatible microorganisms and partial water cultivation.

J. Scattering seeds from air (OISCA: <http://www.oisca.org/indexj.htm>)

They are experimenting with scattering tree seeds mixed in clay pie in a vast desert.

③ Technology concerning regeneration of rainforests.

A. Mixed afforestation (Kikori no HP : <http://www.kikori.org/>)

Afforestation with single tree specie will grow very fast for the first three to four years, but after that the growth slows down and ends up in a failure as the intrusion of pioneer species and ivies cannot be prevented. The Amazon forest area is where a variety of plants are living together, making it almost impossible to develop a pure forest with single tree specie.

B. Soil microorganisms (use of mycorrhiza fungus)

(The General Environmental Technos Co.:

<http://www.kanso.co.jp/> Kansai Electric Power Co.)

Mycorrhiza fungus coexisting with plant roots absorbs nutrients, such as phosphoric acid and nitrogen from the soil and supplies them to the plant. In rain forests, lauan trees, which are dominating plant specie of the high tree strata, coexist with mushrooms (exogenous fungus). Therefore, the method to infect many seedlings efficiently with mycorrhiza fungus (method of infecting the mother tree) was developed to cultivate seedlings infected with mycorrhiza fungus.

④ Technology concerning regeneration of mangrove forests

(The General Environment Technos Co. <http://www.kanso.co.jp/>
Kansai Electric Power Company)

This technology is to mend the land changed due to excessive development for shrimp farming, bring back to a state close to what was before, and restore the natural exchange of water. A favorable early growth of mangrove can be achieved by finding the optimum specie for the location, treating the seedlings before planting, and giving an appropriate soil improving agent. At the same time, a silvo fishery, which is a combination of forestry (silvo) and fishery, is being developed to give economical benefits to the local residents even while the trees are in the stage of growing.