

## 2) Nature regeneration technologies

As the Kyoto Protocol goes into effect in February 2005, Japan will be obliged to reduce the amount of emission of gasses causing greenhouse effect, such as carbon dioxide, by six percent in yearly average from 2008 to 2012. In order to achieve this target, besides reducing carbon dioxide emission by saving energy, absorbing it with plants such as forests is considered to be effective. This indicates that regeneration of natural environment plays a major role in preventing global warming.

Japan is blessed with diversified and rich natural environment and we receive various benefits from it. But changes in our lifestyles and excessive use of natural resources beyond the capacity of nature to regenerate itself, have resulted in a decline of dry beaches, alga grounds, and marshlands. Also due to poor maintenance of suburban mountains, the quality of the ecosystem in Japan is deteriorating. What were once very familiar to us, such as Japanese killifish and Chinese bellflowers are faced with extinction, an indication that our natural environment is going through a drastic change for worse.

For this reason, the report on the Conference on the Creation of "Wa-no-kuni," an Eco-society through Partnership in the

21<sup>st</sup> Century, which was presided by the Prime Minister in July 2001, declared "it is necessary to promote "public works that actively regenerate nature by introducing the method of adaptable maintenance, that is a type of public works that can regenerate nature." Consequently, "the Law for the Promotion of Nature Regeneration" was enacted in December 2002 and has been in effect since January 1, 2003.

1) What is nature regeneration?

"Nature regeneration" mentioned in "the Law for the Promotion of Nature Regeneration," is defined as follows: "to conserve, regenerate, create, maintain, and manage the natural environment with the participation of various entities of the region for the purpose of restoring ecosystems lost in the past and other natural environment."

In another words, nature regeneration means to change the old way of relating with nature, in which mankind took away natural resources one-sidedly while destroying it, and restore a healthy ecosystem by giving a "helping hand," to nature, meaning conservation, regeneration, creation, maintenance and management, to rivers, marshlands, dry beaches, alga grounds, suburban mountains and lands, forests and so on that have been lost in the past.

In Japan, various entities are engaged in an array of activities to regenerate nature in operation districts, such as Kushiro Marshland (the National Park of Kushiro Marshland), and Mount Kunugi (Saitama Prefecture), as well as investigation districts, such as Odaigahara (the National Park of Yoshino Kumano) and the dry beach at Fushino River (Yamaguchi Prefecture).

(figure)

Basic policies to promote nature regeneration comprehensively... made by the government. (Environment Minister prepares a draft based on deliberation with Agricultural, Forestry and Fishery Ministers and Land, Infrastructure and Transport Ministers, and decided on the Cabinet – reviewed almost every five years)

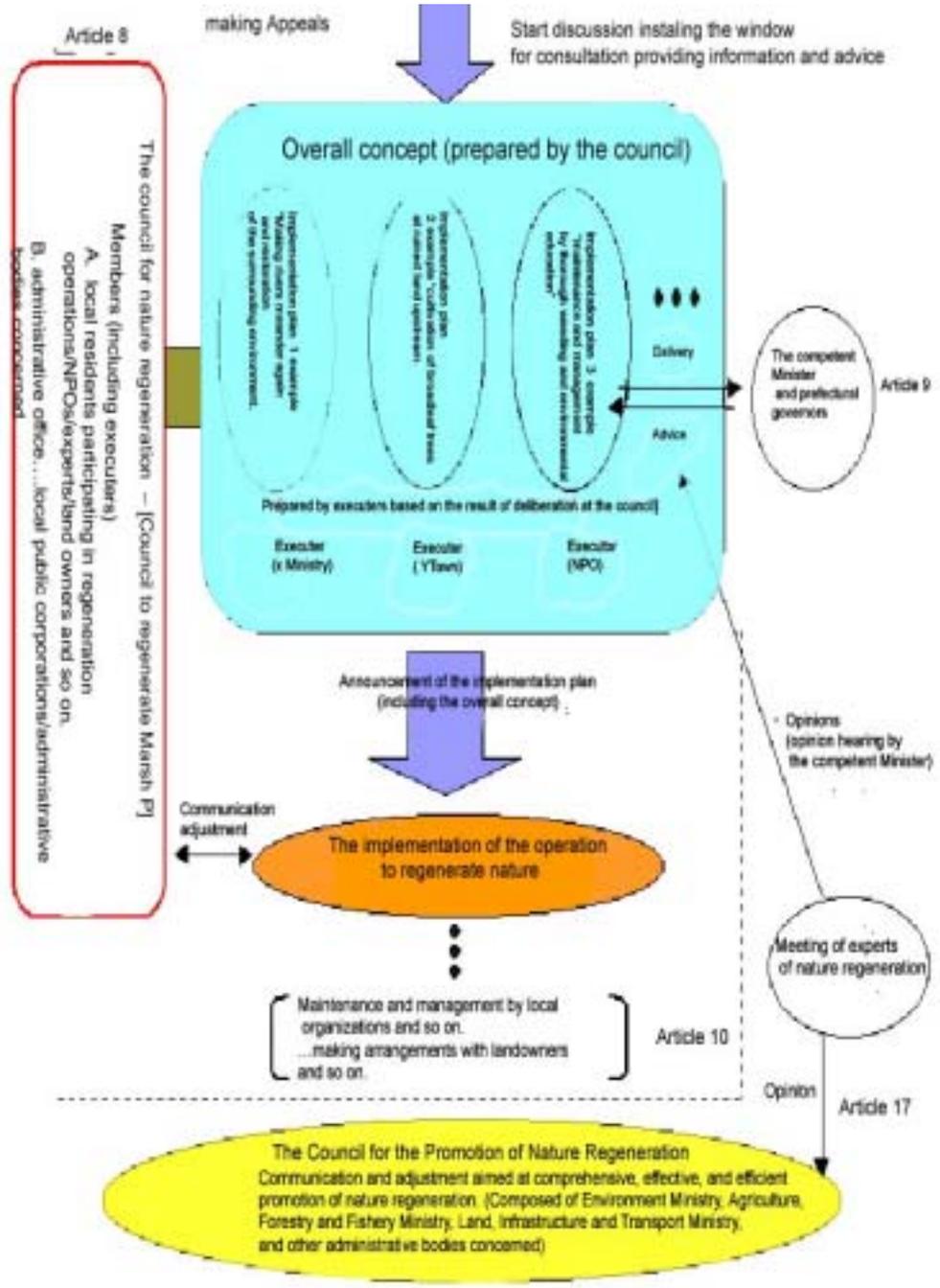
The Article 7

( Each Region )

Example : X marsh of Y prefecture

Administrative bodies/enthusiastic NPOs and so on.

local public organizations/related administrative bodies concerned



The system of the Law for the Promotion of Nature Regeneration  
Taken from the homepage of the Ministry of Environment  
<http://www.env.go.jp/>

2) Places where measures to regenerate nature are taken.

① Regeneration of secondary forests

From the viewpoint of fixation of carbon dioxide, forests play an important role. But many of the plantations and suburban forests today are in a state of having been abandoned, dark with shrubs thickly grown, and they cannot be described as being healthy. Furthermore, wild flowering plants are diminishing obstructed by those shrubs. In order to help grow these flowering plants and regenerate secondary forests, management such as lessening the competition with other shrubs by selective weeding and making the sunlight reach the forest bed by thinning and cutting down trees selectively is carried out.



weeding



a secondary forest where the trees have been cut selectively

② River regeneration

The river works in Japan thus far prioritized flood control and irrigation. Because of this, mud accumulated along river

beds, causing vegetation peculiar to the river to disappear. There are also places that have become the habitat of imported species.

In an effort to regenerate such rivers, measures encompassing the whole area, from the upstream to downstream, are necessary. For instance, preventing mud from flowing into rivers by developing lakeside forests, and restoring the renewal function of the river environment by bringing it back to the original meandering state.



A river once straight and lacking variations now regenerated with diversity. (Nefbach River, Zurich State, Switzerland)

### ③ Marshland regeneration

In a marshland that has been left abandoned for a long time, flowering plants diminish due to vegetation transition, and soon trees such as willows and alders start to grow. As time goes on, it becomes a dry land, where overgrown grass with long caulis and trees block the sunlight, causing many wild living things in marshland to dwindle.

In regenerating a marshland, it is necessary to regenerate it in different stages of vegetation transition. Also, as in the case of river regeneration, measures to cover the whole area are necessary.

Rivers and waterways upstream, which had been straightened, are being restored to its original state of meandering, while lakeside forests are being regenerated in an effort to prevent mudflow into marshlands. In marshlands, there is also a measure taken to regenerate a versatile environment by growing and managing ditch reeds by mowing.



A brook and marshland regenerated (Krepsbach River, Zurich State, Switzerland)

#### ④ Regeneration of algae grounds and dry beaches

Japan is surrounded by the ocean. Along the coastline, cities and industrial zones were developed with road systems, and consequently, the areas of dry beaches and alga grounds diminished, causing the ability of nature to cleanse the seawater to decline.

Regeneration of dry beaches and algae grounds are proceeded also with the purpose of developing fishing grounds and nurseries. This is to regenerate algae grounds by physically constructing an environment and improving the seabed quality. The methods include turning over earth and sand dredged due to the development of sea routes inside a bank to be built at the seabed using natural material such as rocks. There is also a new technology being developed, which uses plant material to cleanse the environment, such as installing bamboo grillages and laying bamboo charcoals.

⑤ Environmental education, diffusion and enlightenment

The operation to regenerate nature is to help nature restore itself by removing what is giving adverse effects to the current state of nature. This would take a long time to take a deep hold upon the region involved. It will also require participation of various entities, including local residents, NPOs, local governments, and so on. In order to realize this, there must be a common awareness toward nature regeneration shared by the whole community.

At present, activities such as studying the local environment, making biotopos in the community and schools are spreading throughout the country. Along with the technological

development to conserve the environment, educating citizens and children on the environment is also important in conserving nature.



Making a biotopos at school  
(Yaitsu Municipal Elementary School)



Group to study nature in the neighborhood (Nakaikemi Hito to Shizen no Fureai no Sato "Place where people can come into touch with nature")

### 3) Technology of nature regeneration using plants

#### ① Nature regeneration with soil seed banks

Up until today, for greening of the faces of slopes emerged due to road development and the like, vegetation was usually regenerated by sowing seeds of imported grass. While this enabled quick greening, it was not something that took into account the regional ecosystem. Therefore, in recent years, regenerating vegetation using soil seed banks is drawing much attention. Inside the soil, there are many seeds (buried seeds) lying still until the soil meets conditions for germination, namely moisture and temperature. This new technology being developed uses these seeds to regenerate the vegetation native to the region.

② Nature regeneration with transplantation of top soil

At a place where nature is to be regenerated, while regeneration method using seed banks and the like are being applied in the case of stocks and seeds with small distribution, there is also a method of transplanting topsoil itself. Topsoil contains not only plant seeds but also a large amount of nutrients necessary for plants to grow, such as organic substances dissolved by microorganisms. This technology utilizes all of them to regenerate nature.

③ Nature regeneration using twigs

This is a method of using twigs for places vulnerable to scooping and erosion for the purpose of foot protection work (mattress of twigs) and making sand guard. By using lumber from thinning or miscellaneous trees from the river area for those twigs, regeneration of secondary forests can be done simultaneously. For freshly cut lumber, there are cases where they germinate and take root at the place, which can be effective in regenerating vegetation at the river wall.



Foot protection using twigs  
(Hagawa Kachi River, Niigata  
Prefecture)



River wall where nature has  
been regenerated (Nigori  
River Ecology Park, Niigata  
Prefecture)

④ Nature regeneration along the coast using water plants

Regeneration of coast using ditch reed fields involves restoring floating and underwater plants in stages. By utilizing their effects of blocking waves and forming shallows, the method protects the vegetation bank of reeds from eroding, thereby regenerating the coast.

In addition, reed stocks having a width of some degree would serve as a shelter for fry and small fish to protect themselves from foreign fish, which brings back a diversified environment.

⑤ Water environment regeneration using water plants

By cultivating emergent plants such as ditch reeds and cattails

in stocks, the nutrients in the water are absorbed along with microorganisms attached to the plants. Oxygen supplied at the root part will promote the dissolution and nitrification thereby regenerating the water environment. However, in the method of cleaning water using water plants, since removing those plants that had absorbed nutrients becomes important, mowing of ditch reeds has been carried out throughout the country.



Regeneration and protection of a shore bank with water plants and, regeneration of a water environment. (Krebsbach River, Zurich, Switzerland)

⑥ Water environment regeneration with cultivation of a floating island.

In order to improve the water quality at lakes, marshes, and ponds, there is a technology to cultivate water plants such as cattails on a manmade floating island. Here, vegetation can be developed in the water area, and their roots in the water would serve as a habitat for small animals in the water, including fish and water insects.

The technology to cultivate a manmade floating island can be applied in various water areas as it can be readily moved,

enlarged, and removed and that the installation shape can easily be changed.



Manmade floating island installed at a golf course

- ⑦ Vegetation shore bank regeneration using vegetation rolls
- Using vegetation rolls is one of the technologies to regenerate nature at the water edge, which had been fortified by concrete and the like. Vegetation rolls are plant fibers such as that of palm trees filled up in rolls, where waterside plants, including ditch reeds and water oats are cultivated and reared. By installing them with plants already grown, plant stocks at the waterside can be formed quickly, making it possible to lessen the intrusion of unintended plants. While this is a superior technology, it is important to use seeds that are suitable to the region and location and consider the genetic diversity of these plants, when cultivating plants in this kind of place.