

Research on Watershed/Urban Regeneration in Accord with Nature

YASUDA Yoshiya

Head of the River Environment Division, Environment Department

1. Background and Goals of the Research

The environment of a city where people spend their lives receives generous benefits and is greatly influenced by the water cycle, material cycles dependent on water, and the ecosystem of the watershed that surrounds the city. Urbanization and inadequate management of forests in watersheds in Japan have severely disrupted water and material cycles and ecosystems, resulting in serious deterioration of urban environments.

To restore an urban environment so its residents can enjoy the beneficence of nature, it is essential to establish measures based on the perspective of an entire watershed to clarify the state of the environment, conserve nature, forests, and farmland, to curb environmental pollution, to conserve water environments and create ecological networks, and to practice national land management to restore cities in a symbiotic relationship with nature through restoring the water cycle and the ecosystem. The goal of this research, a three-year research project that will begin next year, is to create watersheds and cities in a symbiotic relationship with nature. In advance of the start of full-scale research, this report describes the content of the research and the results that it is expected to achieve.

As research in the environmental field that is a priority of the Council for Science and Technology Policy, it is stipulated by the Research Initiative for Technologies for the Watershed/Urban Regeneration in Accord with Nature, and will be undertaken jointly with the Ministry of Agriculture, Forestry, and Fisheries and the Ministry of the Environment.

2. Content and Structure of the Research

This research will involve 6 themes under 4 research programs. These themes will be carried out by the Environment Department, Water Quality Control Department, and River Department (Fig. 1).

The following are the research policies and the outputs anticipated at this time for each theme in each program.

(1) City and watershed environment monitoring program

To resolve problems that occur in watersheds and cities, monitoring will be done to clarify and evaluate the functions and actual state of the water and material cycles and ecosystems in watersheds and cities and a data base will be established.

[1] Monitoring and the clarification and evaluation of functions and actual conditions

The effects on bodies of water and ecosystems in watersheds and cities of population increase, changing land use, changes in the quantities of materials used and discharged will be clarified. And the actual state of water and material cycles and ecosystems will also be clarified through monitoring (Figs. 2, 3).

[2] Provision of a data base

Basic data concerning the topography, geology, rainfall,

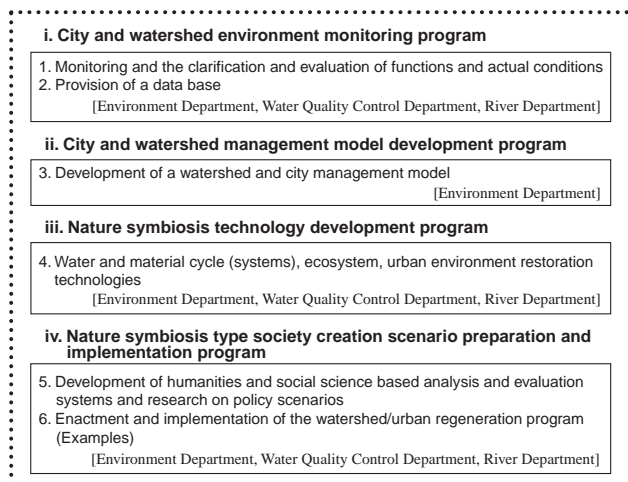


Fig. 1. Research Programs, and Research Themes.

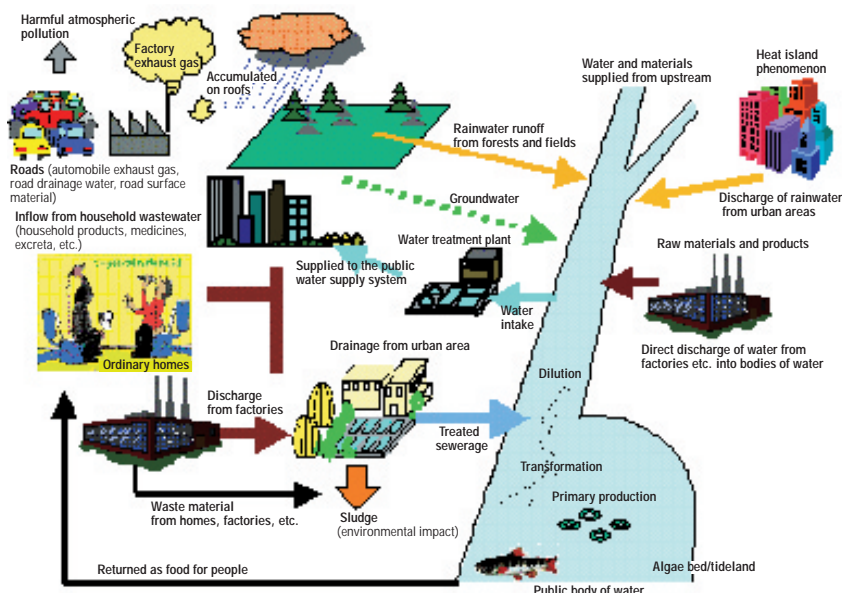
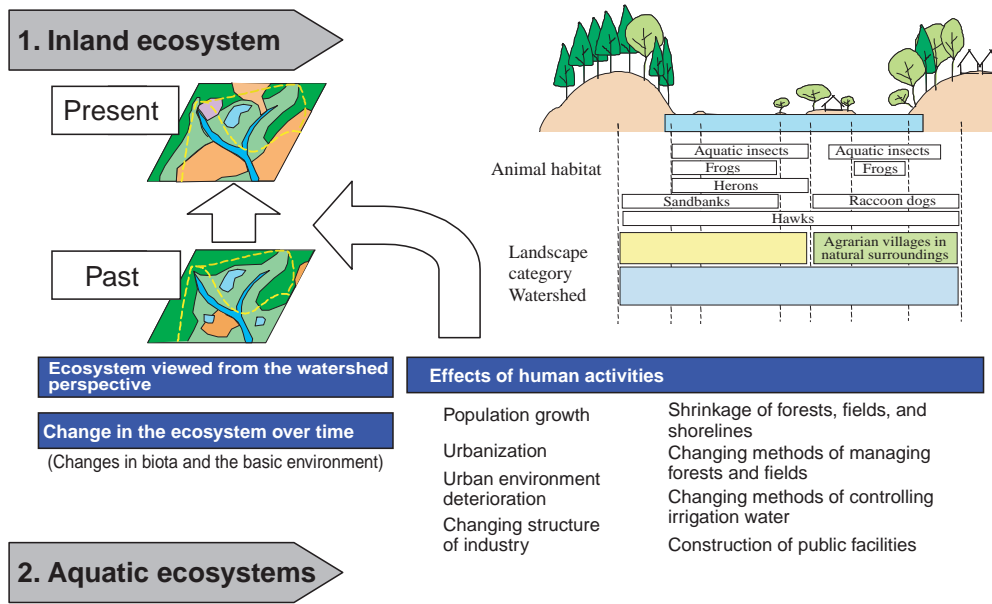


Fig. 2. Monitoring and Clarifying the State of Water and Material Cycles.



● Ecosystems in rivers, lakes/marshes, coastlines, and the sea

Fig. 3. Monitoring and Clarification of the State and Functions of Ecosystems.

population, land use, ecosystems, population dynamics, changes in land use, etc. in a model watershed will be obtained, incorporated in a geographical information system (GIS), then used to develop water and material cycle models and ecosystem models to create a base for policy scenario analysis (Fig. 4).

- (2) City and watershed management model development program
- [3] Watershed and city management model construction

The effects of changes in watersheds and cities on water and material cycles and ecosystems will be predicted to construct water and material cycle models and ecosystem models that can be used to quantitatively estimate future measures in order to assess their value. This will be accompanied by a study of an integrated model that can integrate the two models in a geographical information system (GIS).

- (3) Nature symbiosis technology development program
- [4] Technology to restore water and material cycle (systems), ecosystems, and urban environments.
- Water environment restoration technologies to resolve problems with water and material cycles etc., and conservation and restoration technologies for ecological networks that will resolve ecosystem problems will be developed.
- (4) Nature symbiosis type society creation scenario preparation and implementation program
- [5] Development of humanities and social science based analysis and evaluation systems and research on policy scenarios

To enact the watersheds and cities in a symbiotic rela-

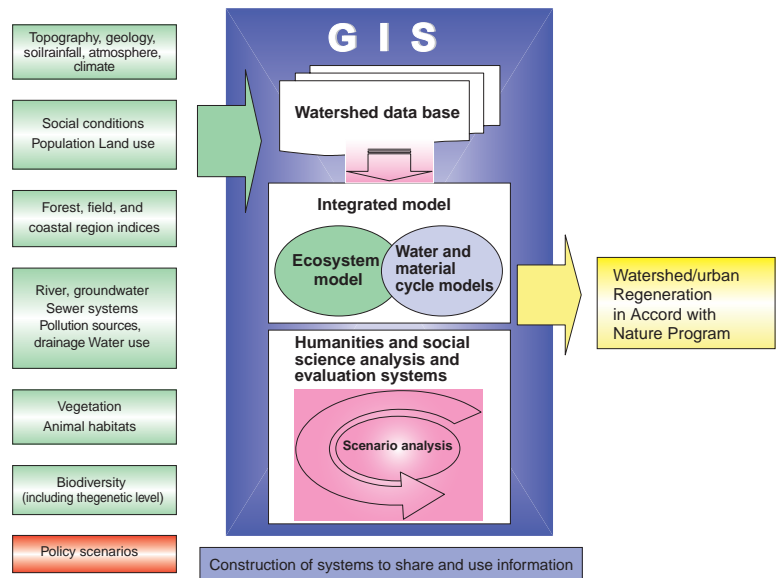


Fig. 4. Conversion of Basic Data to GIS and its Application.

tionship with nature restoration program, research based on the humanities and social sciences will be undertaken to develop technologies needed to enact, analyze, and evaluate specific policy scenarios, methods of evaluating the public acceptance of policies, and methods of forming a consensus that account for resident participation and the fairness of procedures etc.

- [6] Enactment and implementation of the Watershed/Urban Regeneration Program (Examples)

Specific research will be undertaken to plan and implement the model watershed/urban regeneration program. The goals of the restoration program are "restoration of contact with nature and water and material cycles," "conservation

● **Special Features: The Environment**

and restoration of water environments and ecosystems," and "restoration of the water, greenery, and environment of cities." Scenarios for these will be prepared for each watershed and city (Figs. 5, 6).

3. Efforts During the Year

Activities related to this research have partly begun. To

prepare for next year, a GIS Study Group, Consensus Formation Research Committee, and Urban Environment Restoration Research Committee have been formed. A workshop for researchers was held on February 9th with the cooperation of the Ministry of Agriculture, Forestry, and Fisheries and the Ministry of the Environment.

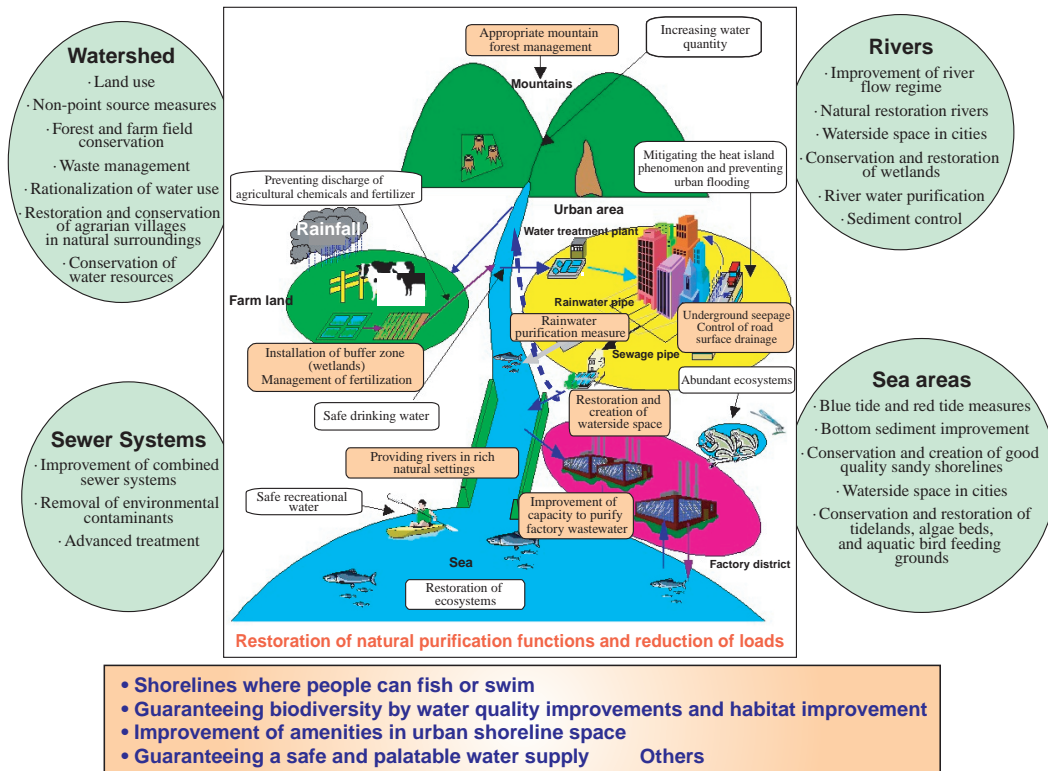


Fig. 5. Sample Restoration Program (1) (Conservation and Restoration of Water Environment and Ecosystems).

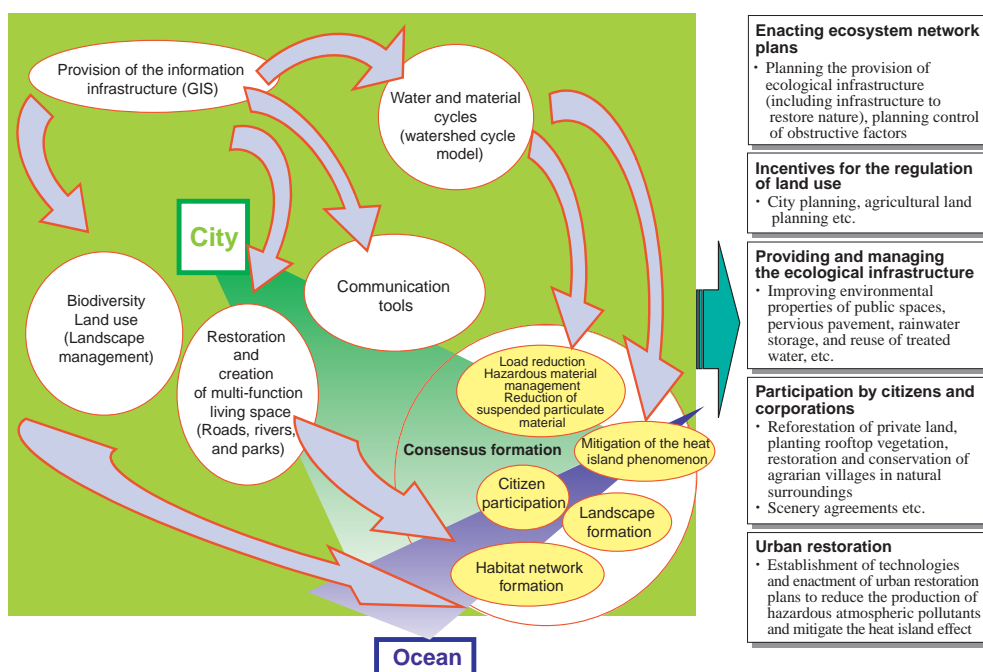


Fig. 6. Restoration Program Example (2) (Restoring Water, Greenery, and the Environment in Cities).