

Methodology of integrated watershed management for sustainable water resources use

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Abstract Water resources in the Asia region are very severe and scarce, and a very rapid population increase is apparent in recent years. This rapid population increase causes not only increase of water demand but also affect the land use change, resulting land degradation, soil erosion and change in hydrologic regimes. To overcome those water crises, it is necessary to develop a methodology and analytical methods for the desired watershed management. In the paper, the author proposed an integrated watershed management as one of the desired watershed managements for the next generation and showed a framework and a research flow of the management emphasizing the capacity building and the water governance as well as scientific researches on water resources issues.

Key words integrated watershed management, capacity building, water governance, decision making, OJT program, Sassari declaration

INTRODUCTION

Water resources in the Asia region are very severe and scarce, and a very rapid population increase is apparent in recent years. This rapid population increase causes not only increase of water demand but also affect largely the land use change, that is land degradation, soil erosion and change in hydrologic regimes. In the past century, the land use change in Asia regions occurred from the forest to agricultural uses, but in the last few decades the land use conversion has been mostly from the agricultural to non-agricultural uses. For example, in Indonesia, the critical watersheds reached up to 60 watersheds with areal extent of 43 million hectares in 1998 and have increased to 59 million hectares in 2005, and the extent of these critical watersheds influence strongly on the regional hydrological condition and the water resources status.

To overcome those water crises, it is necessary to develop a methodology and analytical methods for the desired watershed management. It is also necessary to enhance the technology transfer, the capacity building and the water governance to maintain and continue the established watershed management for sustainable water resources development, water use and its conservation in a future.

RESEARCH FRAMEWORK AND RESEARCH FLOW

The JSPS-DGHE (Directorate General of Higher Education, Indonesia) Joint Research Project on “Watershed Management for Sustainable Water Resources Development in a Humid Tropical Region” has been launched in 2007 for three years continue project. The framework and the research flow of the project are shown in Figs. 1 and 2, respectively. The specific objectives of the project are as follows:

- 1) Develop a new methodology and new technologies for water resources

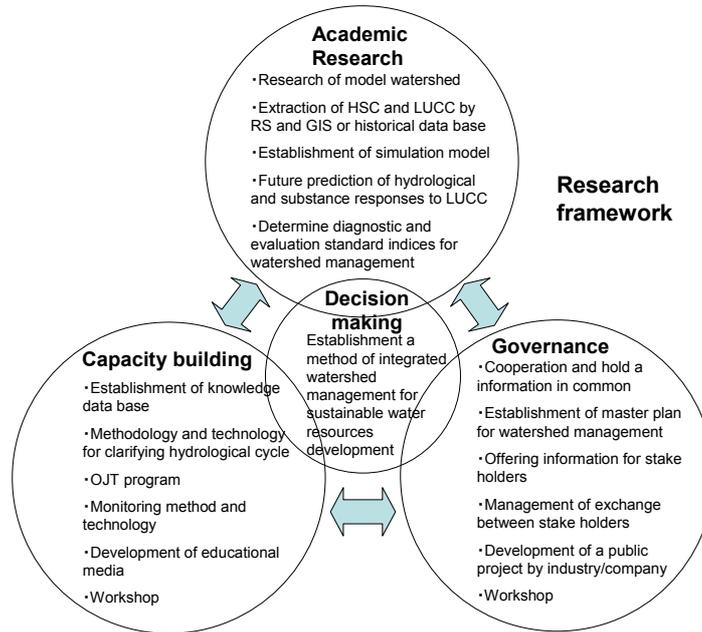


Fig. 1 Research framework of integrated watershed management for sustainable water resources development.

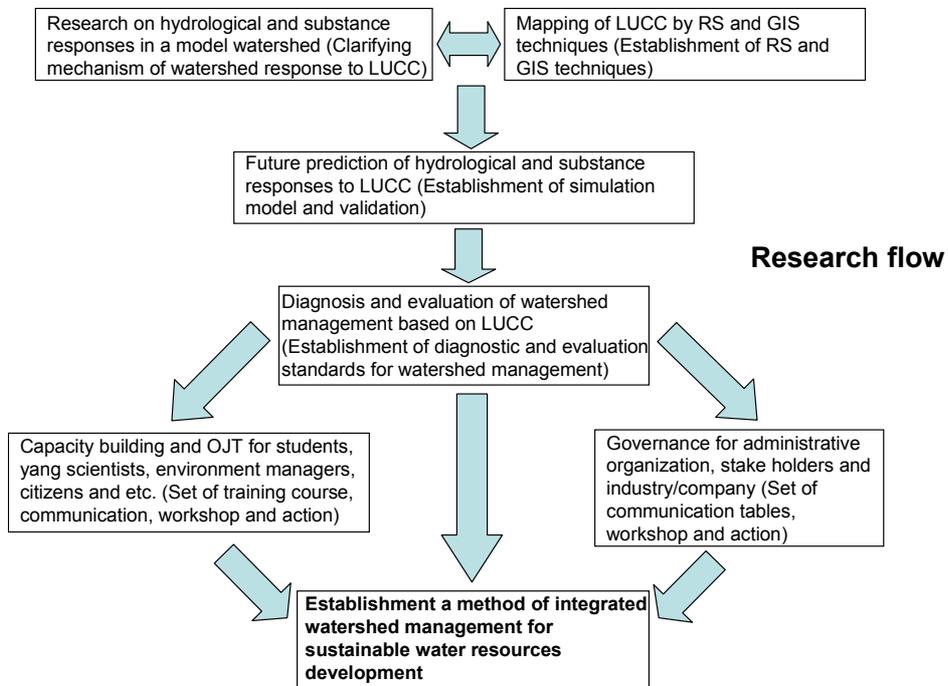


Fig. 2 Research flow of integrated watershed management for sustainable water resources development.

For the capacity building, it is effective to make an On-the-Job Training (OJT) Program for students, technicians, yang scientist, environment managers, citizens and etc. As an example, On-the-Job Training Program for Water Resources Problem in China has been carried out by us with 20 trainers of graduate students and technicians (TERC, 2008). The purpose of the program is to build up knowledge, skill, incentive and general business capacity of young talent, and the program also includes the planning and training of field survey, the review of social and scientific backgrounds for water resources problem in China. Although, this is one of models of OJT, if the preparation of the program is enough well, it can work very effectively as one of methods of capacity building. Another important point regarding the capacity building is to become aware of the importance of continuous monitor the subject matters and to make the data base of its monitoring results. For this purpose, it is necessary to carried out a training course of monitoring methods and techniques for students, technicians and etc.

The most problem and thus difficult part of the framework shown in Fig. 1 may be the governance. This part includes relationships among local stakeholders, local leaders, government institutions companies and etc. The important point of this part is how to set communication tables/ places and who takes the leadership. Subagyono (2005) has pointed out the practice of governance as follows:

- Undertake community and local stakeholder workshops to review experiences and with focused on the particular roles and responsibilities of marginalized groups, communities, local leaders and government institutions in land use system management to enhance the available water resources.

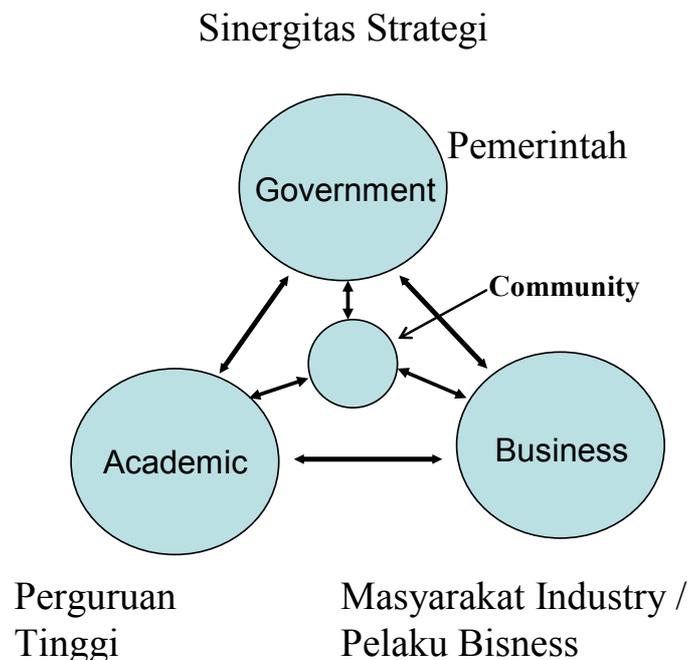


Fig. 4 The ABCG synergic strategy by Supriyanto (2007).

- Investigate options that would facilitate enhancing social processes, information flows, institutional incentives and other factors necessary for creating effective and inclusive institutional frameworks for assuring available water resource within each of target watersheds.

- Undertake workshops with members of rural extension and development services and regulatory institutions to improve institutional structures and policies that effect an enhancement in land use management for sustainable water resources.

- Conduct round table dialogue discussions with key decision makers to present results from research and other activities of the needs of communities in the target watersheds and implications associated with policy changes and implementations.

To success the governance, to get the results from academic researches of the subject is the first. In our case, the date and the results/information on hydrological response of a watershed against the dynamic of LUCC would be the necessary ones.

Regarding the forest conservation problems, similar strategy, called the ABCG Synergic Strategy, has been proposed by Supriyanto (2007) as shown in Fig.4. This concept also indicates the importance of mutual communications among stakeholders of ABCG for solving the environment problems such as forest and water conservations.

CONCLUDING REMARKS

In 2003, FAO organized a regional conference on the “Next Generation Watershed Management” at Sassari Province, Italy. Within the context of the Millennium Development Goals (MDGs) and with the intent of preparing for the next generation of watershed management, the purposes of this conference were to 1) provide an adequate opportunity/platform to all concerned parties to share information and contribute a better understanding of the current situation to watershed management, and 2) provide advocacy and support for the implementation of effective watershed management at different levels. The conference has adopted a declaration “Integrated Watershed Management: Water Resources for the Future” as the Sassari Declaration (FAO, 2003).

The Sassari Declaration has emphasized some of the key elements for the next generation of watershed management programs as: a multi-sectoral approach; a combination of bottom-up and top-down planning, monitoring and evaluation; clear procedures for environmental impact assessment of interventions including dams and reservoirs; networking among key stakeholders; consideration of both socio-economic and cultural aspects and natural processes; gender balance in decision making; embracing new approaches for sharing knowledge and learning; sustainable finance; competition mechanisms; capacity building at all levels; reforming governance; linking surface, groundwater and coastal water sources; shift from looking at supply to demand water; efficiency of water use; coping with hydrologic extremes and natural hazards; and the integrated management of water, vegetation, soils and sediments. The declaration also recommended that consideration be given to establishing an international forum that focuses on integrated watershed management including land use and human activities that impact water.

It is not so easy to accomplish and solving the key elements mentioned above for the next generation of watershed management programs, however, it is the time to establish the actual research framework and do act depending on it for the next generation of watershed management issues.

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