

Balancing Multiple Needs in Conflicts for an Urbanized River Basin

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Abstract: Tsurumi River Basin successfully started to prepare a Water Master Plan though a series of discussions by gathering all stakeholders in a hall. It began with setting five management targets namely, flood, low flow, natural environment, emergency use, and recreational use, followed by setting management goals by target as well as a one-sentence catchphrase for the Water Master Plan using a bottom-up approach. The author reviews this process and discusses the background of the success.

1 INTRODUCTION

Watershed management, or “sound water circulation system” as termed by Japan water administrations is the key to correcting the worsening water environment in urban areas. Many have criticized that the fragmented water administration is the critical cause of the worsening water problems. Water is administered by Construction, Agricultural, Industrial, Environmental, and Health and Welfare Ministries and local governments. The Land Agency was supposed to coordinate these water agencies, but had too limited authority in reality to do this, and the 2001 government reorganization gave this scheme little change. It has been able to only set up an initiative and pilot case studies for several small urban watersheds. Some of the case studies successfully formed committees of interested representatives, made a shared vision through a series of meetings, made agreed action plans and carried out periodical monitoring of the actions. However, some have fallen short. In the meantime, voluntary management activities emerged. The most successful case would be the Water Master Planning for the Tsurumi River Basin. It was initiated by Keihin River Office of the former Ministry of Construction, the administrator of the main channel of the Tsurumi River. In this paper, the author looks into why and how success was insured by analyzing meeting discussions and conducting interviews with government officials.

2 OUTLINE OF TSURUMI RIVER BASIN

1.1 Rapid Urbanization and hydrology

The Tsurumi River Basin with a catchment area of 42.5 km² runs along the border of Yokohama, Kawasaki and Inagi cities, as shown in Figure 1. In 1958, it had 10% of urban use area and a population of 400,000 in the basin. In 1999, the urban area had increased to 85% and the population reached 1,840,000 as the basin was rapidly developing from the low-lying area to the hills (Figure 2). Yet, river improvement work has not been carried out fast enough to keep pace with the basin’s speed of development and the flood prone-area has been filled with houses. As a consequence, the residences have suffered serious flood damage, but it has been extremely difficult to expand channel widths because of the difficulty of relocation. In addition to flood prone area development, hydrologic change due to urbanization has worsened damage as shown in Figure 4.

It is noted that Public Works Research Institute (PWRI) was requested to make a report on runoff change in urbanizing areas and to develop a new model to assist flood control planning for rapidly urbanizing river basins. In response to this, PWRI found that the peak discharge would double and that flood concentration time would shorten to 1/5 of the 1958 value in the 1990’s. PWRI also developed a quasi-linear storage model for design. PWRI also expanded this research to

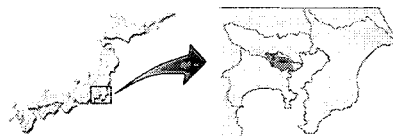


Fig. 1. Location of the Tsurumi River Basin

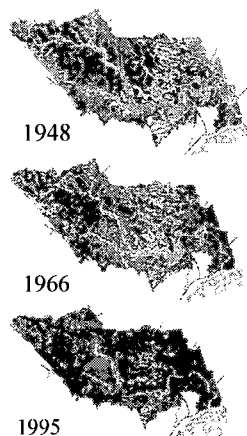


Fig. 2. Expansion of Urban Use Areas (rate of urban use area)



Fig. 3. Areal Photograph of the lower Reach of the Tsurumi River

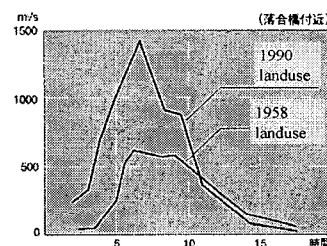


Fig. 4. Runoff Increase Simulations

the national program of experimental basins in urbanizing areas linking with the UNESCO-IHD (Yoshino *et al*, 1990; Committee on Urban Hydrology, 1990).

1.2 Start of “Comprehensive Flood Control Measures”

Facing chronic flood damage in the basin and the pressing need from local residents, municipalities, local government and others, the river administrator, Keihin River Office established the “Flood Disaster Mitigation Plan Committee” in 1976. The committee identified that river work within the jurisdiction under the River Act framework alone would be impossible to control the design flood, and recommended that land-use management be adopted in the flood control plan. On the basis of the committee recommendation, “Tsurumi River Basin Improvement Plan of 1981” was formulated by the river administrator to set the mid-term flood control goal. Although this mid-term plan is not legal, the unanimously-agreed plan innovatively transferred part of flood control responsibility to the basin management group. The plan split the basin into three functional categories by topography: retention area, retarding area, and low-lying area, and the design discharge was allocated to each area. This concept laid the base for the national program named “Comprehensive Flood Control Measures,” applied to 17 basins. By now, about 3,300 flood control regulation reservoirs with a total capacity of 2.8 million m³ have been built in the basin by land developers. “Tsurumi River Basin Improvement Plan of 1981” focuses on the midterm flood control goal, but included enhancement of water amenity concept.

1.3 Emergence of Various Needs

The river administrators have put a lot of effort into building flood control facilities in support of flood sufferers. People did not question this effort. However, as flood risk was reduced, people’s interests were expanded to the natural environment and other areas in the 1980s. The very limited natural environment in this region urged the local population to increase their expectation of rivers: as a recreational area, beneficial use of stream and river space in emergency such as earthquake and fire, playing fields for children, and many others. Many local civil groups were set up to engage in environmental conservation and develop a better community. In 1991 Tsurumi River Basin Network abbreviated to “TR Net” was formed as the network center of 35 civic groups. TR Net has served to facilitate communications between civic groups and government organizations.

3 WATER MASTER PLAN

Responding to the diversified needs of people, the river administrator started a series of discussions in 2001 gathering all interest people in a hall to form a preparatory committee on Tsurumi River Basin Water Master Plan. The committee consists of 17 specialists including the TR-Net representing citizens, and 53 administrative sections from 6 government organizations including sections of sewer, river, city planning, agriculture, parks and greens, disaster prevention, fire, environment, and education. Over 100 people met in a hall in each of the 7 official plenary meetings and discussed issues and tried to build a basic consensus. A number of regional, thematic and technical meetings were held beside the plenary meetings. By the last meeting in 2003, the members agreed on general terms that were written in what is referred to as a water master plan proposal (Foundation for Riverfront Improvement and Restoration, 2003).

Although the committee was to reach agreement in general terms, each committee member was not requested to represent his/her group. This is because continued participation was inevitable and nobody has any right to force them to attend against their will. The first item discussed was management targets. They are flood, normal flow, natural environment, emergency use and recreational use. Normal flow management includes daily flow augment and water quality. The last four targets used to be secondary purpose of management in previous plans, but this plan treats every target on an equal footing. Figure 5 illustrates the concept of identifying management targets. The major four interests of citizens, municipalities, private enterprises, and governments are to develop some actions for the five management targets.

The committee tried to illustrate transitional change of water problems in the Tsurumi River Basin. An example for normal flow is shown in Figure 6. Sewer has been constructed for stormwater control, but it reduced daily flow because water is bypassed to downstream. Another example is that most streams are separated by fences and steep slope to stream that keeps people away from the stream every day and also during emergencies such as in fire and earthquake. For each target, meetings identified goals by target as follows based on a bottom-up approach:

- (1) Flood: protect from the biggest flood after WWII, escapable city, etc;
- (2) Low flow: restore minimum flows, fishable and swimmable water;
- (3) Natural Environment: networking of biotopes by streams, new rule setting, etc;
- (4) Emergency use: infrastructures for disaster mitigation, etc; and
- (5) Recreational use: facilities psychologically-linked to basin.

These goals were aggregated into a single catchphrase to highlight the fundamental objective of this Water Master Plan. Several ideas were aggregated and finally converged to "Vision of restoring the Tsurumi River Basin by connecting our lives and living to Earth."

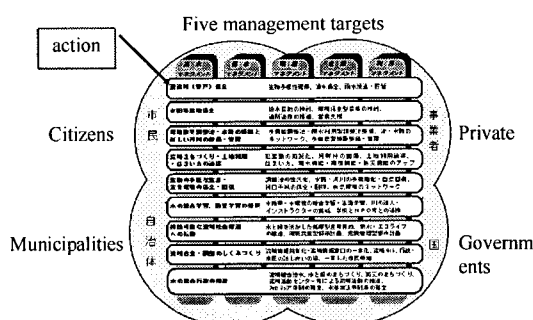
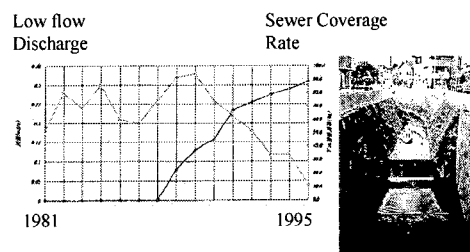


Fig. 5. Matrix of management targets and recommended actions



Low flow rate ranges from 0 to 3.5 m³/s and sewer coverage rate ranges from 0 to 100 % in the above graph.

Fig. 6. Dry-up of stream due to sewer construction



Fig. 7. Typical channel in the Tsurumi River Basin

The committee also recommended several actions to reach management goals beyond the legal framework. For example, preservation of remaining forests in headwater and agricultural lands was recommended, although there is no legal system to stop developing these private lands. These recommendations were further discussed in Water Master Planning Committee

4 DISCUSSION

The important lesson is the process of making the plan. This is a successful example of consensus building among a lot of disputes over water project plans. The reason for success would be that the Water Master Plan involved everybody from the beginning while unsuccessful cases involved only conflicting users after setting a master plan at a higher level. However, more importantly, people in the Tsurumi river basin knew that the basin was overstressed and doing nothing would worsen the current condition. Sharing the common destiny would be the most important requirement in decision making.

Water master planning started with seeking general agreement rather than seeking specific agreement by making an action plan. This process worked well because some stakeholders often do not recognize the purpose of the master planning and are afraid to be criticized in meetings. Importantly, everybody should understand a good solution to a target sometimes gives negative impact to other targets. For example, sewer construction is a very effective solution for flood control and water quality, but as shown in Figure 6 it reduced or dried up daily flow. Channel improvement is a very effective measure for flood control, but it deteriorates the waterfront environment by cutting off the access to the stream. Sewer system construction is a very effective solution to urban inundation and water quality, but it reduces daily flow and therefore gives negative impact to the aquatic ecosystem. This trade-off structure is illustrated in Table 1. A number of plenary meetings were necessary until participants came to realize this fact. This would be a good way to draw compromise from conflicting interests later.

A one-sentence catchphrase worked well in consensus building. It is useful to share the fundamental understanding with people before starting discussion on specifics. As for this basin, most of the residents moved into the basin and had the urban city as a precondition. There are some people who wish to restore the pre-development water environment of the basin. However, the idea of going-back to a pre-1960s water environment is not realistic because only relocating people from the basin makes it possible and because the people who desire this merely ignore negative facets of pre-development water environment like a worse salinity problem and many more water accidents than present. Therefore, such goal is unattainable. A catchphrase implies such fundamental understanding and works to exclude cheap nostalgia. A catchphrase works well also in reflecting local characteristics, very urban and very high expectation of the limited natural environment on the riverfront.

It should be noted that the secretariat of the Committee did much analysis to delineate schemes of conflicts of the alternatives, although it did not mean to request the Committee to make a decision.

Table 1. Trade-off structure of alternatives

Action alternative Management Target	Channel improvement	Construction of sewer system
Flood	+	+
Low flow	No effect	- (quantity)/ + (quality)
Ecosystem	-	- (quantity)/ + (quality)
Emergency use	+ if considered	-
Recreational use	-	-

Legend: + : positive effect, - : negative effect

5 REFERENCES

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