

Study on Environmental Changes of River in the Suburban Area and Transition of Relations between Residents and River

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Abstract

This study dealt with the Kogi River, located in Kaizuka City, Osaka, which has experienced different improvements from the upper through the lower regions, aimed at revealing temporal relations between residents and the river, as well as probing future problems and directions regarding the river in the suburban area, by conducting a survey of local residents.

The result showed that, in the upper region where nature remains in its natural state and the good water quality has been maintained, the relations between the residents and the river continued until around 1965; meanwhile in the middle region the relations have been disappearing since about 1955, and in the lower region where the stream has been repeatedly rehabilitated since 1955, there are fewer involvements of the people with the river. It also revealed that the weaker the relations between people and the river became, the larger the number of residents, even in the upper region, who became concerned over the deteriorating river environment after about 1975, and that in the middle and lower areas, about a decade earlier than in the upper area, the number of those who were aware of the environmental deterioration began to increase. Consequently, with an eye to resuming the relations between people and the river in an suburban area, their future challenges would be the space improvements depending on the environmental characteristics of the area; for example, the recovery of grassy banks for the purpose of protection in the lower region; the preservation and maintenance of many waterside woods as well as the creation of open spaces utilizing the river banks in the middle area; and throughout the whole region, the establishment of a system in which the relations between man and the river can be passed down to future generations, by utilizing the local human resources including those who know the former river landscapes or about the playing in and around the river.

Key Words : River in Suburban Area, Environments Changes, Human Activity, Local Resident, Historical Relation

1. INTRODUCTION

The river running through a suburban area used to be a playground for local residents, where the water

flow and the nature on the riverside are valuable things that give them refreshment and relaxation¹⁾. As urbanization proceeded, however, the river environment has greatly changed. It is said that we

should keep away from the river since it is regarded as a dangerous place. Now that the river is one of the few remaining natural surroundings close to us, it is necessary for us to see the river as part of our living environment again, aiming at its restoration, while looking back at those days when it was closely connected with people's life^{2,3)}.

To this end, this study dealt with the Kogi River, located in Kaizuka City, Osaka, which has experienced improvements different among regions through the river, in order to clarify historical relations between the residents and the river, and probe future problems and directions on the river in the suburban area, through a survey of local residents.

II. METHODS

1. The Setting of The Subject River and Physical Environmental Features

The Kogi River, having its origin in Mt. Katsuragi which is 858 meters high, and located on the border between Osaka prefecture and Wakayama prefecture, runs down to the northwest through almost the middle of Kaizuka City, into Osaka Bay (Fig. 1). It is a second-class river, with a total length of approximately 15.45 km, including extended channels. In the upper region, the Kogi River winds through the mountains, along which small villages are spotted, forming a rural landscape mingled with the nature. As to the water quality, it proved to be relatively favorable with a BOD value of 3.0 mg/l in 2001. Since the rehabilitation of the riverbanks in 1952, there have been no large-scale improvement works. The present embankments are made of either piled stones or blocks. The river has retained some vestige of its former natural shape (Picture 1): for example, rocks or stones exposed over the riverbed can be seen often,

and many swift currents and depths are still found. As to the cross-sectional structure, the river is 23.2 meters wide including dry riverbeds, with about 5 meters difference in height between the bank top and the water surface, the right bank having a relatively gentle slope (Fig. 2). The middle region underwent land development into home lots along the river in 1970s, but it is nevertheless rich in valleys and woods along the waterside, forming a thick forest belt (Picture 2). The riverbed is made up of sands and pebbles, and the river meanders, forming many sand bars. Like the upper region, the middle region has not experienced any large-scale improvement works since the riverbanks were rehabilitated in the 1950s. The embankments are built with blocks, and the river width is 20.0 meters including the dry riverbeds (Fig. 3). In the lower region, triggered by a flood that occurred in Senshu region in July, 1952, an aid program for the disaster-stricken area was launched in 1954, whereby the serpentine area, ranging from the river-mouth to about 600 meters upstream, was improved into the present straight-line shape. In addition, due to the damage caused by Typhoon Jane in September, 1950, and Second Muroto Typhoon in September, 1961, Senshu tidal-wave prevention

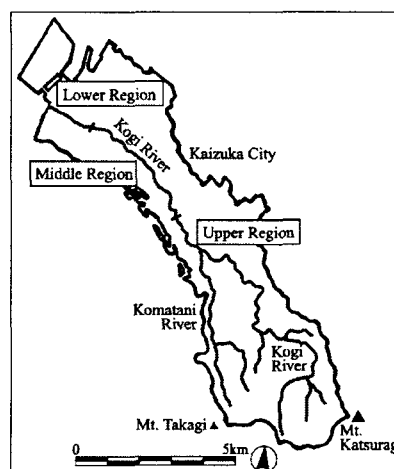
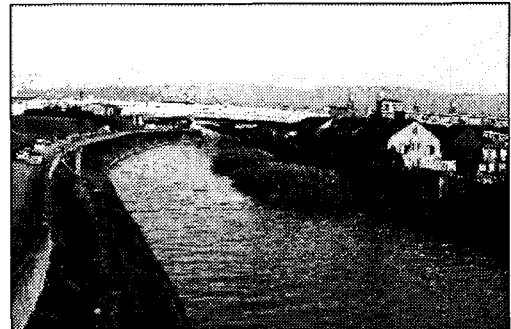


Figure 1. Location Map



Picture 1. River Landscape in the Upper Region (2003)



Picture 3. River Landscape in the Lower Region (2003)

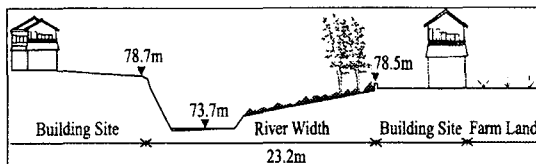


Figure 2. Cross Section in the Upper Region (2003)

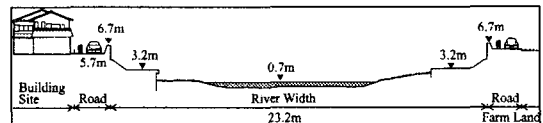
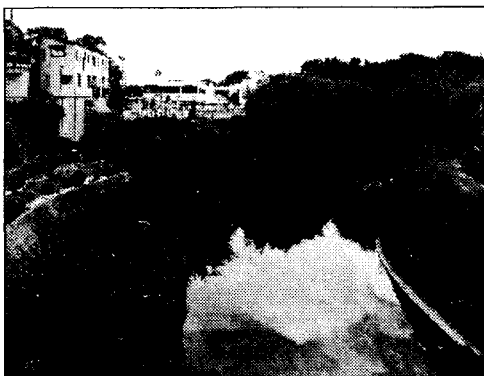


Figure 4. Cross Section in the Upper Region (2003)



Picture 2. River Landscape in the Middle Region (2003)

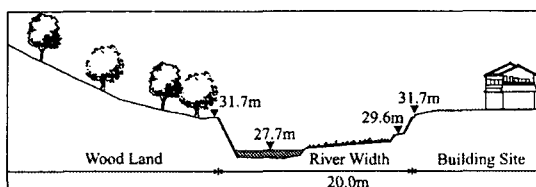


Figure 3. Cross Section in the Middle Region (2003)

program was carried out. As a result, embankments, protected by plate stakes or blocks, with the height of OP +6.5m were completed in 1971 in the range from the river-mouth to Permanent Bridge (Picture 3).

As to the cross-sectional structure, the width including dry riverbeds is 44.8 meters, and the difference between the embankment top and the water surface is about 6.5 meters. The embankments are made about 1.0 meter higher than the river roads (Fig. 4). Regarding the water quality, its BOD value was quite high in 1983 with 50 mg/l. Though the value dropped afterwards, it was one of the worst among second-class rivers in Japan in 1993 with 25 mg/l. Even in 2001, it still had a high BOD value of 13 mg/l⁴⁾ Thus, the Kogi River was chosen as the subject for this research, as it runs through an suburban area and differs in development conditions and urbanization among the upper, middle and lower regions.

2. Study and Analytical Methods

A survey was conducted in November, 2003, in which questionnaires were distributed at random, and collected by mail. Among the collected questionnaires, only the responses from those who had lived for over 30 years, and in the area of a distance from Kogi River within 500m were treated as valid. The number

of valid answers in each region was: 58 in the upper, 65 in the middle, and 28 in the lower region. It showed that the collection rate of the lower region to be low in comparison with other region has an influence that the consciousness for the Kogi River of the people of the lower region is low. As for the attribute of the questionnaires, in the sex, a man occupied about 70.0% in all regions, in the age, the 50's and the 60's age occupied about 30.0% each other, the 40's age occupied about 20.0% in all regions. Respondents were required to fill in the questionnaire writing the three questions. In the first question, "Experience of playing in and around the river", respondents were asked until about when. In the next question, "Awareness of the environmental changes in the river", respondents were asked from about when. As to the last question, "Hope for future river usage", they were allowed to choose one or more items, as shown in Fig. 6. These results were analyzed in such a way that all returns were simply tallied up and the proportion of the answers to the whole was taken into consideration.

III. RESULTS

1. Experience of Playing in and around the River

Looking at SWIMMING among the items on "plays using the water", in the upper region, the top answer were 35.3% "around 1965", followed by 33.3% "around 1955" (Fig. 5). In the middle region, the highest choice was "around 1955" with 31.0%, followed by "around 1965" with 26.2%. On the other hand, in the lower region, "no experience" has come out on top with 52.6%. As for FISHING, in the upper region, "around 1965" stood first with 28.8%, followed by "around 1955" with 21.2%. Meanwhile in the middle region, the top was "around 1965" with 24.4%,

and yet "around 1955" and "around 1945", both showing the same and quite high figure of 22.0%, were in the second place. In the lower region, as to SWIMMING, "no experience" showed the highest with 35.0%. With regard to COLLECTING LIVING THINGS IN THE WATER, in the upper region, the highest was "around 1965" with 29.4%, whereas in the middle region, "around 1955" with 28.6%. In the lower region, both "around 1955" and "around 1965" were the highest with 25.0%. Regarding FLOATING A BOAT MADE OF A BAMBOO GRASS LEAF, 33.3% selected "around 1965" in the upper region, 25.0% "around 1955" in the middle region top the others respectively, while "around 1935" and "no experience" were in the highest range between 21.1% and 26.3% in the lower region.

Thus, the results above indicated that the play using river water sharply decreased in number after 1965, which was common in the three regions. In particular, as prominently seen in the active play activities using water, such as SWIMMING and FISHING, the middle region began to show signs of sharply dropping about a decade earlier, namely around 1955, than in the upper region. It also revealed that such active playing using water have, so far, rarely been seen in the lower region.

Taking a look at "plays on the riverside", regarding STONE THROWING and INSECT CATCHING (Fig. 5), "around 1965" was rather high, with 19.6% compared to 30.8% in all regions. As to ENJOYING VIEW, "no experience" came out on top in all regions, too, ranging from 29.4 to 44.4%. On the other hand, regarding WALKING NEARBY, the item "still doing now" was rather high, with 15.2 to 18.8%, in every region, compared with that in other play items.

The results above showed that the play activities on the riverside such as throwing stones and catching insects suddenly became rare after 1965, the same as the plays using river water. It was also made clear that, although a number of local residents often

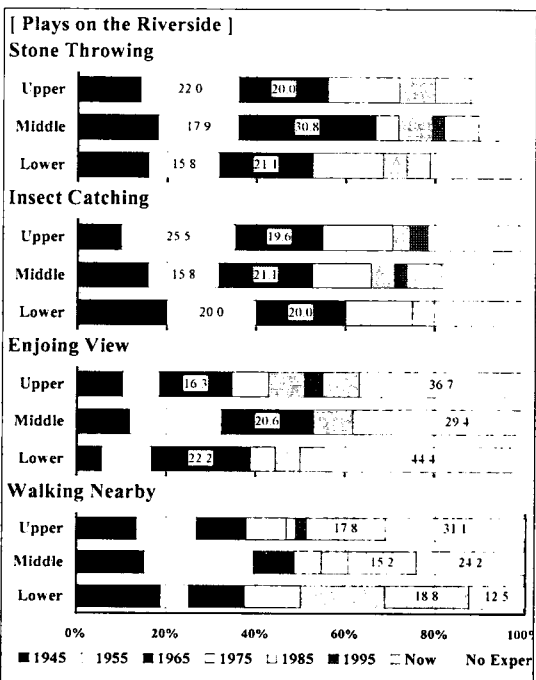
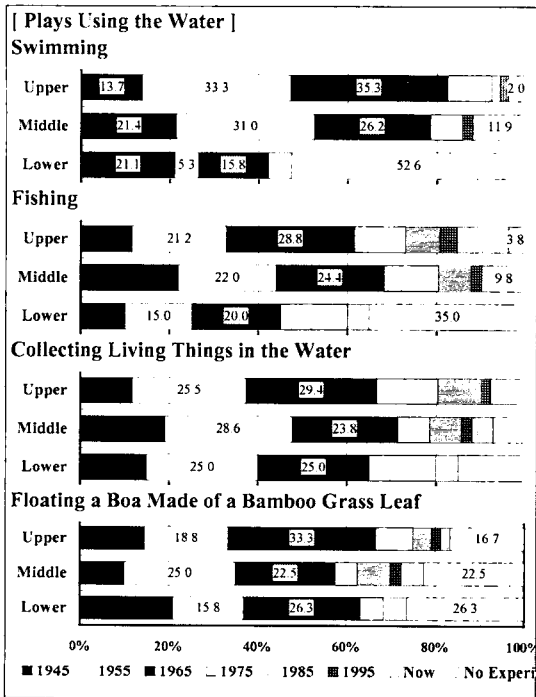


Figure 5. Experience of Playing in around the River

passed near the river even now, they were not enjoying the river view so much while walking

nearby.

2. Awareness of the Environmental Changes in the River

As to DECREASE OF FIREFLIES, in the upper region, "around 1975" was the highest response with 33.3%, followed by "around 1965" with 15.7% and then "around 1985" with 19.6% (Fig. 6). In the middle region, "around 1965" tops the others, with 43.9%. In the lower region, "around 1955" took the

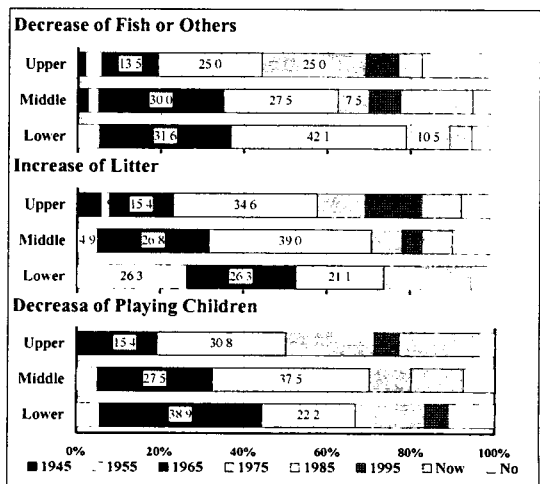
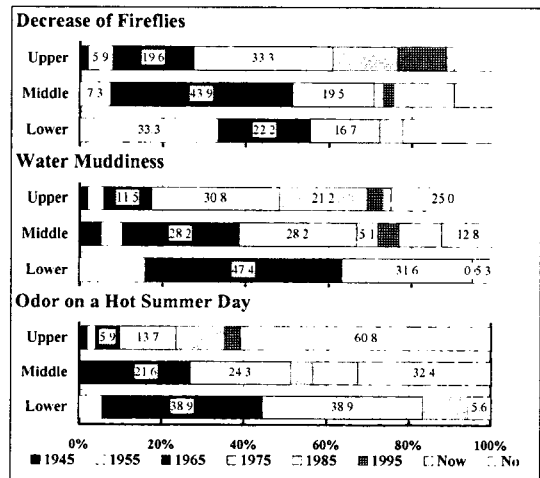


Figure 6. Awareness of the Environmental Changes in the River

first place with 33.3%. With regard to WATER MUDDINESS, in the upper region, "around 1975" stood first with 30.8%, followed by "around 1985" with 21.2%. In the middle and lower regions, "around 1965" and "around 1975" were their highest, with 28.2% and 47.4% respectively. About ODOR ON A HOT SUMMER DAY, in the upper region, "none even now" was the highest with 60.8%. In the middle region, although "none even now" was the top with 32.4%, it is followed by "around 1975" with 24.3% and "around 1965" with 21.6%. In the lower region, both "around 1965" and "around 1975" were the highest with 38.9%. As to DECREASE OF FISH OR OTHERS, INCREASE OF LITTER, DECREASE OF PLAYING CHILDREN, in the upper region, "around 1975" was the highest with 25.0 to 34.6%. In the middle and lower regions, however, "around 1965" came out on top with 26.8 to 38.9%.

This result demonstrated that the time when local residents became aware of the environmental changes in the Kogi River was different among the upper, middle, and lower regions. For example, people in the upper region have realized the environmental changes in the river such as those of water quality and the decrease of creatures including fireflies, fish, etc., since around 1975, while people in the middle and lower regions had already observed them about a decade before, beginning to have concerns about the environmental changes in the river in about 1965. Especially, residents in the middle and lower regions have become aware of the water muddiness and odors on a hot summer day since around 1965, when they also started seeing fewer children playing on the riverside, as fish or other living things were disappearing.

3. Hopes for the Future River Use

Being common in all of the upper, middle, and

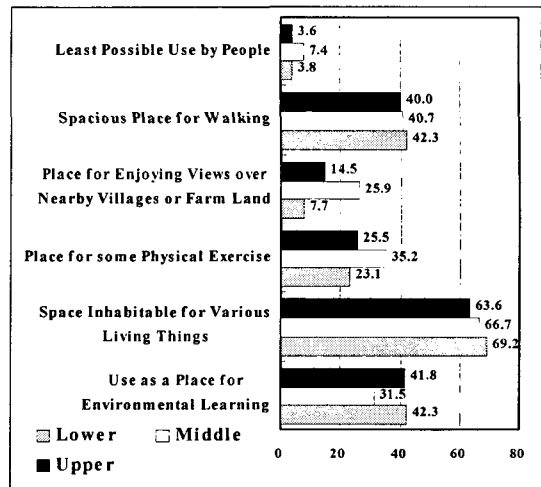


Figure 7. Hopes for the Future River Use

lower regions, SPACE INHABITABLE FOR VARIOUS LIVING THINGS (FISH, INSECT AND OTHERS) came out on top with 63.6 to 69.2%, followed by SPACIOUS PLACE FOR WALKING with 40.0 to 42.3% (Fig. 7). In the upper and middle regions, in addition to the above, USE AS A PLACE FOR ENVIRONMENTAL LEARNING was also high with 41.8% and 42.3% respectively. Compared with those in the other two regions, more people in the middle region chose PLACE FOR ENJOYING VIEWS OVER NEARBY VILLAGES OR FARM LAND, and PLACE FOR SOME PHYSICAL EXERCISE, with 25.9% and 35.2%. Meanwhile, in all of the regions, LEAST POSSIBLE USE BY PEOPLE was quite low, with 3.6 to 7.4%.

The results above indicated that it was strongly requested by the local residents of all regions that the river should be maintained or rehabilitated to be a habitat for a variety of living things (fish, insect and others). Likewise, it also showed that they hope they would like to know about creatures or plants living in and around the river through enjoying the river view during their daily walk, or actively utilizing the river as a place for environmental learning. Furthermore, the middle region was characterized by the demand

for setting up a playground or a small open space on the riverside.

IV. CONCLUSION AND RECOMMENDATIONS

Based on considerations of the above results, it was made clear that the middle region began to lose the relations between residents and the river after around 1955, about a decade earlier than the upper region where the nature remains as it were and good water quality has been maintained. The results also indicated that the lower region was characterized by the facts that the water has seriously deteriorated, that the river improvement works were carried out in earlier days, that the embankments built higher than the riverside roads made the river almost invisible to people on the riverside roads, and that therefore there has been little relation between people and the river.

As the relation between people and the river were becoming less and less, the change of water quality, and the decrease of fireflies, fish, etc. became a concern among people even in the upper region after around 1975, not to mention those in the middle and lower regions, who became concerned about them about ten years earlier than the people in the upper region.

Being common in all regions, it is requested that the river be appraised as a precious habitat for many living environments, the river gives refreshment and relaxation to local residents during their daily walking, thereby, and also a new relation between the river

and people be developed through the active use of river as a place for environmental education. In the middle region, in particular, accessibility to the river is needed to be improved, and to set up open spaces on the river side and keep them in good condition so as to draw more people.

In conclusion, for space improvements of the river, different approaches should be taken according to each region with different environmental features. For example, in the lower region, it is required to recover grassy banks for protection, whereas in the middle region it is required to set up open spaces by utilizing the river sides, while preserving the area abundant in riverside woods. Furthermore, throughout the whole river, their future challenge would be the establishment of a system in which the relations between residents and the river can be passed down to future generations, by utilizing the local human resources including those who know the former river landscapes or about the play activities in and around the river.

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