

Verification of river landscape mapping using width/depth ratio in Yamaguchi prefecture

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1. Introduction

Rivers is very important part in the water cycle, acting as drainage channels for surface water. Further, rivers also provide excellent habitat and food for many of the earth's organisms. We can change river environment by improving the river channel. There are several purpose of river channel improvement. However, it is hard to accurately define how human activities affect the river morphology and ecology, as they were continuous and ubiquitous with multiple direct and indirect consequences.

This study is, through mapping river landscape type of Yamaguchi Prefecture, to know which rivers need some countermeasure to improve their fish habitat condition. In here, the river landscape using Oish's (2014) proposition that the river landscape can be explained by two parameters Fr and $BI^{0.2}/H$. Figure 1 is explained what is the river landscape type and river morphology for each types. Type I is sandbar, type II is step-pool, type III is bedrock and type IV is flat river bed.

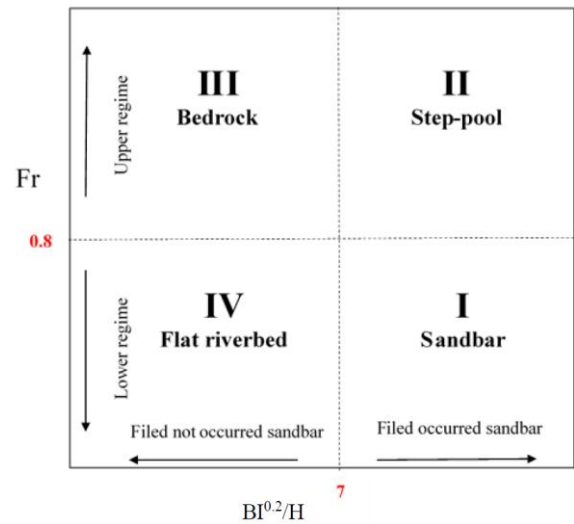


Figure 1: The domain concept map of river landscape

2. Method

2.1. River landscape type mapping

Through the data of river width, slope, water depth, river flow, Froude Number and width/depth ratio then the river landscape map was mapped. The mapping method was that put the data of river width, slope, water depth, river flow, river landscape type as a text format in ArcGIS. The result of river landscape mapping is shown in figure 2. Figure 2 showed type I was the red line, type II was orange line, type III was green line, and type IV was blue line. And the dominant landscape was type III, while the recessive landscape was type I. Overall, Yamaguchi prefecture had 39% of the river in good habitat.

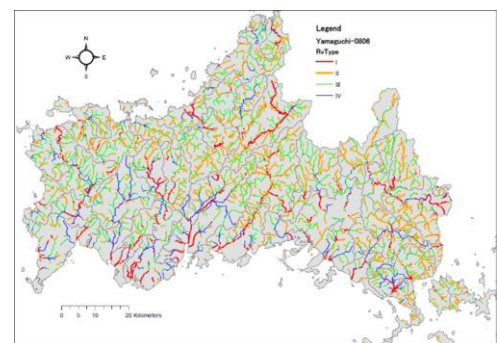


Figure 2: River landscape map

2.2. Field investigation

In order to verify the river landscape map and fish inhabitation condition, two rivers were chose as validation sites: Oota River and Majime River. The verification method was by taking the geo-coordinate pictures for each validation point. The location of the picture and the point of the estimated landscape type were same coordinate. In addition to, in this study measured the crown width, low-water channel width and the width of surface water using the TRUPULSE 2000. Furthermore, for the measurement of the slope by RTK-GPS Surveying (Trimble 5700/5800). The method was measured the depth of normal stage of water for every point locations. And according the river landscape map, choose the actual river landscape type and estimated river landscape type were same location. Put the fishnet on the interval, interval meant that the distance was 20 meters between upper reaches and

lower reaches in selected location. And flatted the fishnet in the river, shown a natural state in the interval. Waited for 30 minutes, and pulled up the fishnet and captured.

3. Result and Discussion

According to the river landscape map and the actual field measurements, compared the river landscape map and river landscape by surveying in Oota River showed in table 1. It said that for the same location compared the river landscape type of river landscape map and river landscape by surveying. The blue one expressed river landscape map and red one expressed river landscape by surveying.

And figure 3 showed the relationship between fish species of different rivers and river landscape type in Yamaguchi Prefecture. In here, I used data including the Oota River, Majime River, and before I had the data for Kotou River, Ichinosaka River, Kuden River, Sawanami River and Yoshiwa River. In Oota River lower reaches had 3 river landscape types, sandbar, step-pool and flat of river bed. And the fish species were equivalent the 10, 9 and 10. In Oota River upper reaches had 4 river landscape types, sandbar, step-pool, bedrock and flat of river bed. And the fish species were equivalent the 13, 6, 9 and 10.

4. Conclusion

1. Based on the river landscape map, 61% of river sections were categorized as type III and IV, which meant 61% rivers needed some countermeasure to improve their fish habitat condition.
2. From the comparison between river landscape map and river landscape by surveying, we knew that for Oota River, the type of river landscape map corresponded 73% to river landscape by surveying.
3. Comparison between the fish habitation and the river landscape based on field survey, we found,
 - a) Domain type I was superior as fish habitat. It agreed with Oishi’s hypothesis.
 - b) Domain type II might be superior fish habitat for upper basin, but more information be required.
 - c) Domain type III and IV cannot judge fish habitat superiority.

5. References

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[2] KURT D. FAUSCH, CHRISTIAN E. TORGERSEN, COLDEN V. BAXTER and HIRAM W. LI (June 2002). *Landscape to riverscapes: Bridging the gap between research and conservation of stream fishes*. Vol. 52, No 6, BioScience.

Table 1. comparison the river landscape map and river landscape by surveying in Oota River

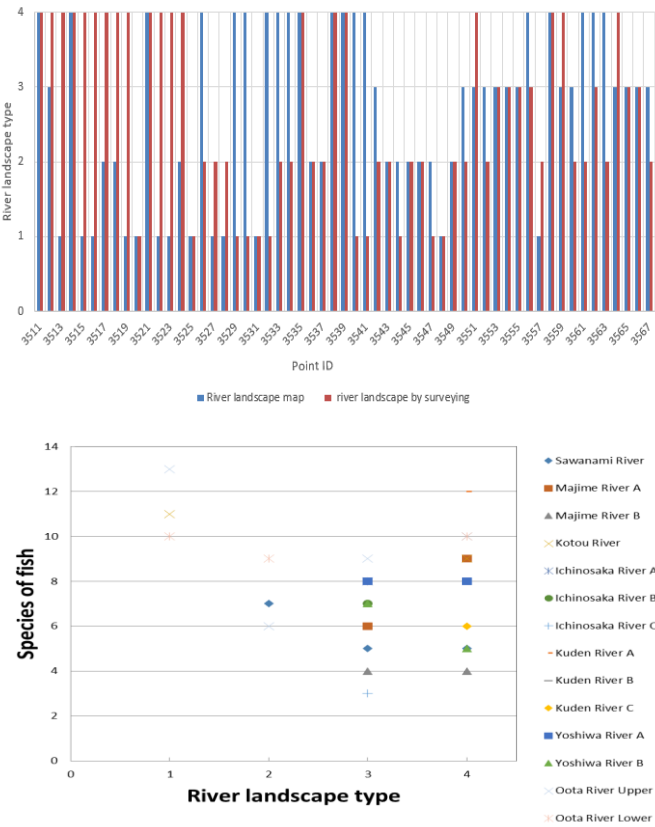


Figure 3: The relationship between fish species and river landscape type