

Cluster analysis of fish community and vegetation community for grasping the river ecosystem on basin scale

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TWINSpan, Classification Trees, Model, GIS

1. Abstract

I verified a model for grasping the river ecosystem on basin scale. I investigated fish community and vegetation community on the Ichikawa-river at pref. of Hyogo in Japan. Then I clustered their community by TWINSpan that is one of the Cluster analysis. Next, I verified the relation between the cluster as the result of TWINSpan and physical conditions by Classification Trees. As the result, I created a new model that is able to grasp the river ecosystem on basin scale and could assess the river ecosystem by the model.

Table-1 Characteristic of physical conditions group of fish community

Group of physical conditions	Physical conditions	Characteristic	Group of stand
EFG1	Distance from the mouth of a river (<23.6 km) Width of river (>=24.2m)	the lower reaches of main stream	FG2 (83.33%) FG1 (16.67%)
EFG2	Distance from the mouth of a river (<23.6 km) Width of river (<24.2m)	the lower reaches of branch streams	FG3 (55.56%) FG2 (22.22%) FG4 (11.11%) FG5 (11.11%)
EFG3	Distance from the mouth of a river (23.6 km~32.98 km)	the middle reaches	FG5 (70.00%) FG2 (10.00%) FG3 (10.00%) FG6 (10.00%)
EFG4	Distance from the mouth of a river(>=32.98 km) Ratio of alluvium (>=0.082) Ratio of afforested area (<71.6%)	Reaches on alluvial fan	FG6 (88.89%) FG8 (11.11%)
EFG5	Distance from the mouth of a river(>=32.98 km) Ratio of alluvium (>=0.082) Ratio of afforested area (>=71.6%)	Reaches on alluvial fan	FG8 (83.33%) FG9 (16.67%)
EFG6	Distance from the mouth of a river(>=32.98 km) Ratio of alluvium (0.067~0.082)	Reaches on valley bottom plain	FG7 (70.00%) FG8 (30.00%)
EFG7	Distance from the mouth of a river(>=32.98 km) Ratio of alluvium (<0.067)	a mountain torrent	FG9 (87.50%) FG2 (12.50%)

Table-2 Characteristic of physical conditions group of vegetation community

Group of physical conditions	Physical conditions	Characteristic	Group of stand
EVG1	Ratio of alluvium (>=0.108) Width of river (>=10.6m)	Wide reaches on alluvial fan or alluvial plain	VG2 (80.95%) VG1 (4.76%) VG3 (4.76%) VG4 (4.76%) VG8 (4.76%)
EVG2	Ratio of alluvium (<=0.108) Width of river (<10.6m) Average of stone size (<=15.6 cm)	Narrow reaches on alluvial plain without pebbles	VG3 (100.0%)
EVG3	Ratio of alluvium (<=0.108) Width of river (<10.6m) Average of stone size (>=15.6 cm)	Narrow reaches on alluvial plain with pebbles	VG4 (28.57%) VG5 (28.57%) VG7 (28.57%) VG2 (14.29%)
EVG4	Ratio of alluvium (<0.108) Slope of reach (>=0.025)	Reaches on valley bottom plain	VG7 (75.00%) VG8 (25.00%)
EVG5	Ratio of alluvium (<0.108) Slope of reach (<0.025)	Reaches on valley bottom plain	VG6 (90.48%) VG7 (9.52%)

Figure-1 Flow of analysis

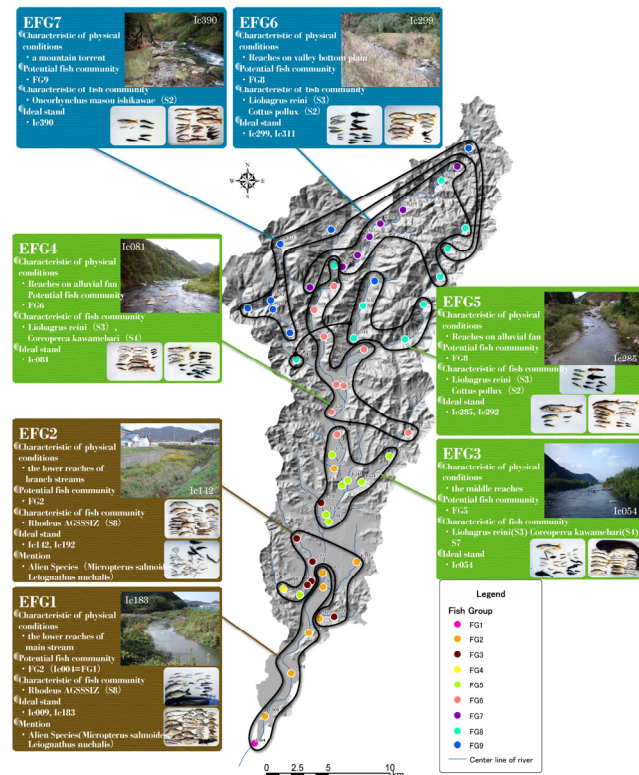


Figure-2 Assessment of river ecosystem by fish community

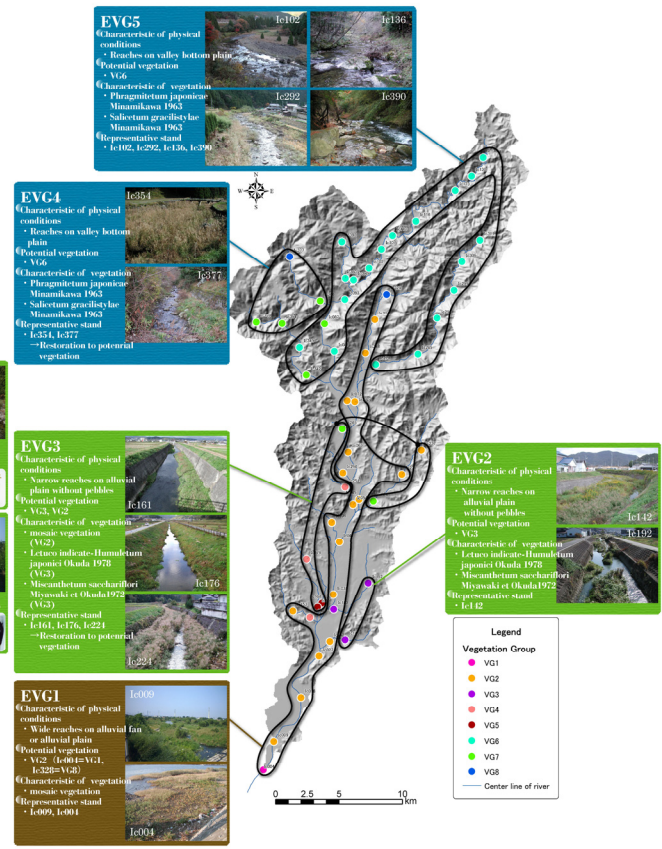


Figure-2 Assessment of river ecosystem by vegetation community