

# Effect of eco-friendly restoration on the community characteristics of benthic macroinvertebrates in forested bog

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## Introduction

The effect of restoration on forested bog's ecosystem was examined in southern part of S. Korea. The variation in abundance of benthic macroinvertebrates was monitored for two years from 2015-2016. It's aquatic ecosystem changes were compared before and after restoration which built to protect soil erosion in Milbat bog, S. Korea.

The present study had a goal of identifying the stability of the community structure and aquatic ecological system of benthic

macroinvertebrate after the restoration in order to evaluate the restoration function of aquatic ecological systems according the eco-friendly restoration; and to provide a basic data that prepares both the development of a restoration method for forested wetland which considers the environment and management plan for wetland ecosystems.

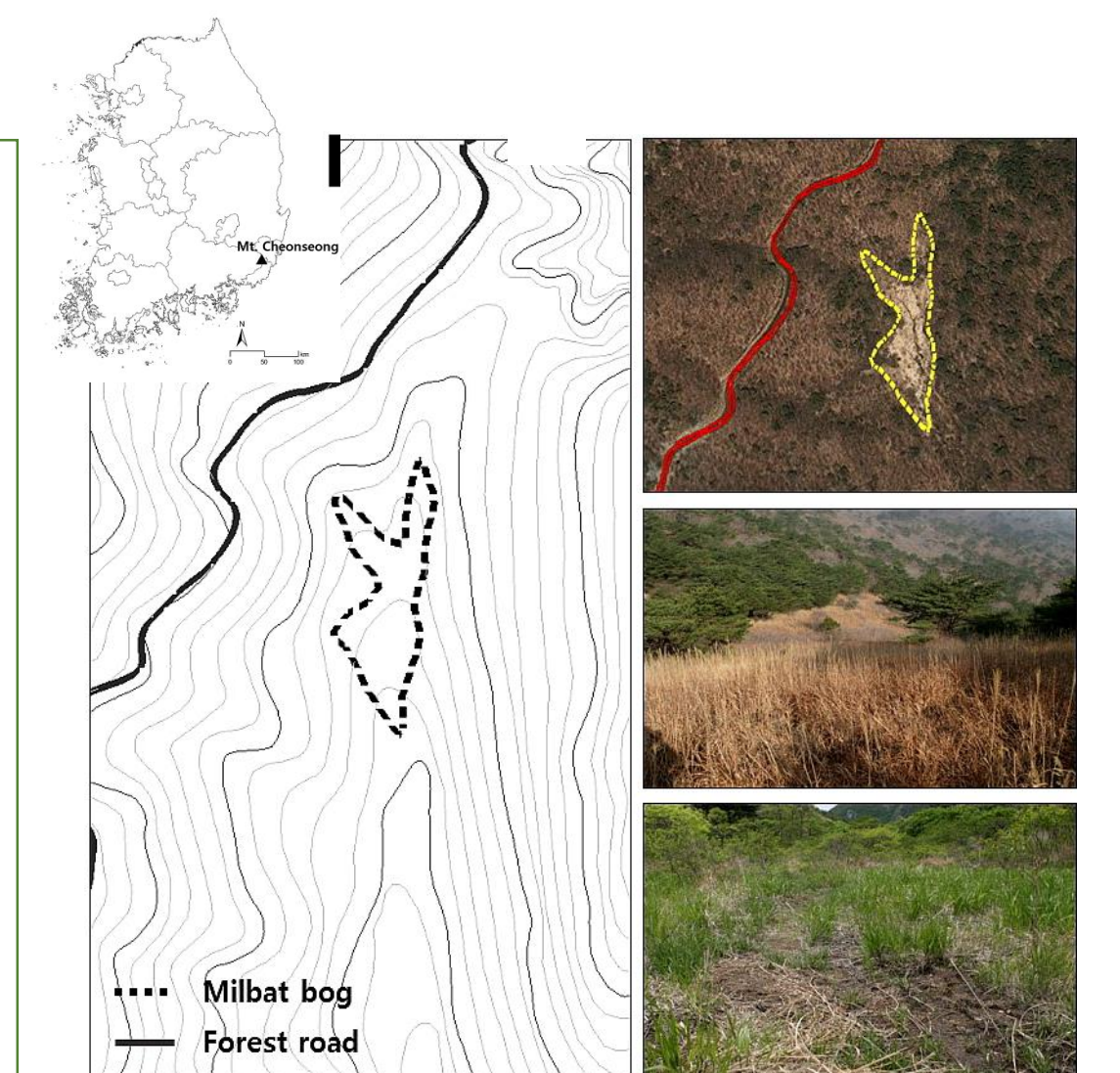


Fig 1. Survey location

## Materials and Methods

### 1. Sampling location & date

The survey site located in Yangsan city, S. Korea(Fig 1). For the restoration of a Milbat bog which is the target site of the present study, a structure was installed at both sides of the stream where the damage had occurred except for the inside of the wetland in order to minimize disturbances to the ecosystem(Fig 2).

The samples were collected from May 2015(right after restoration) to May 2016(12 month after restoration) at forest bog. (September 2015: 6 month after restoration).

### 2. Sampling method

Benthic macroinvertebrates were quantitatively sampled from May 2015 to May 2016. Quantitative sampling was done using a surber net(30x30cm) each site.

Biodiversity indices, including dominance, diversity, richness and evenness, were calculated.. And we evaluated the biological water quality with several known methods, and concluded that ESB (Ecological Score of Benthic macroinvertebrates Index) and FFGs(Functional Feeding Groups), Community Stability to assess the biological diversity aquatic ecosystem of forest bog.

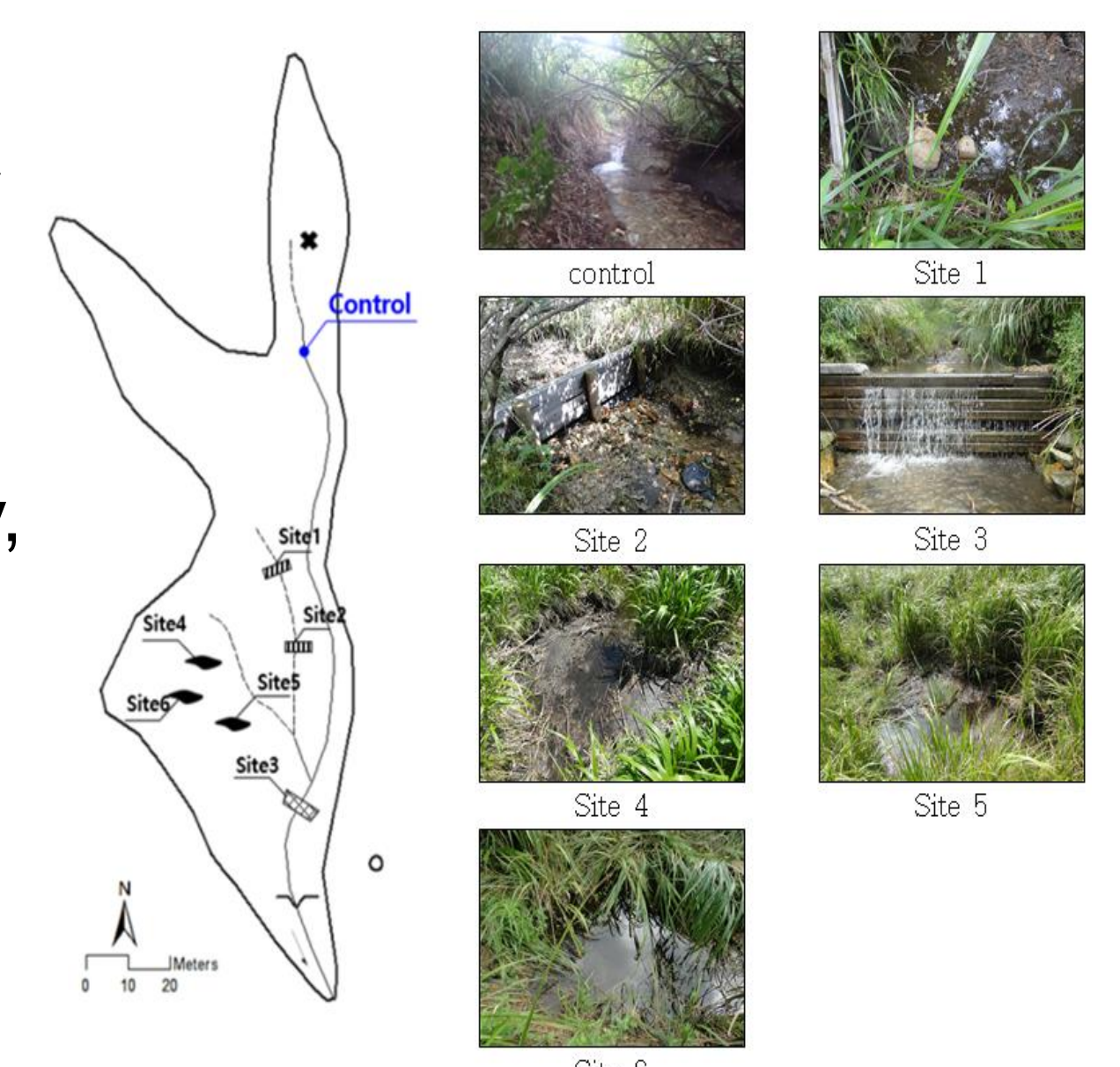


Fig 2. structure for restoration in Milbat bog

## Results and Discussions

1. The benthic macroinvertebrates collected from the surveyed sites were composed of 1,071 individuals, 60 species, 40 families, 13 orders, 6 classes and 5 phyla. At the control and Site 3(small dam), the number of species and individuals were larger than that of other sites, and EPT group ratio was same as well.

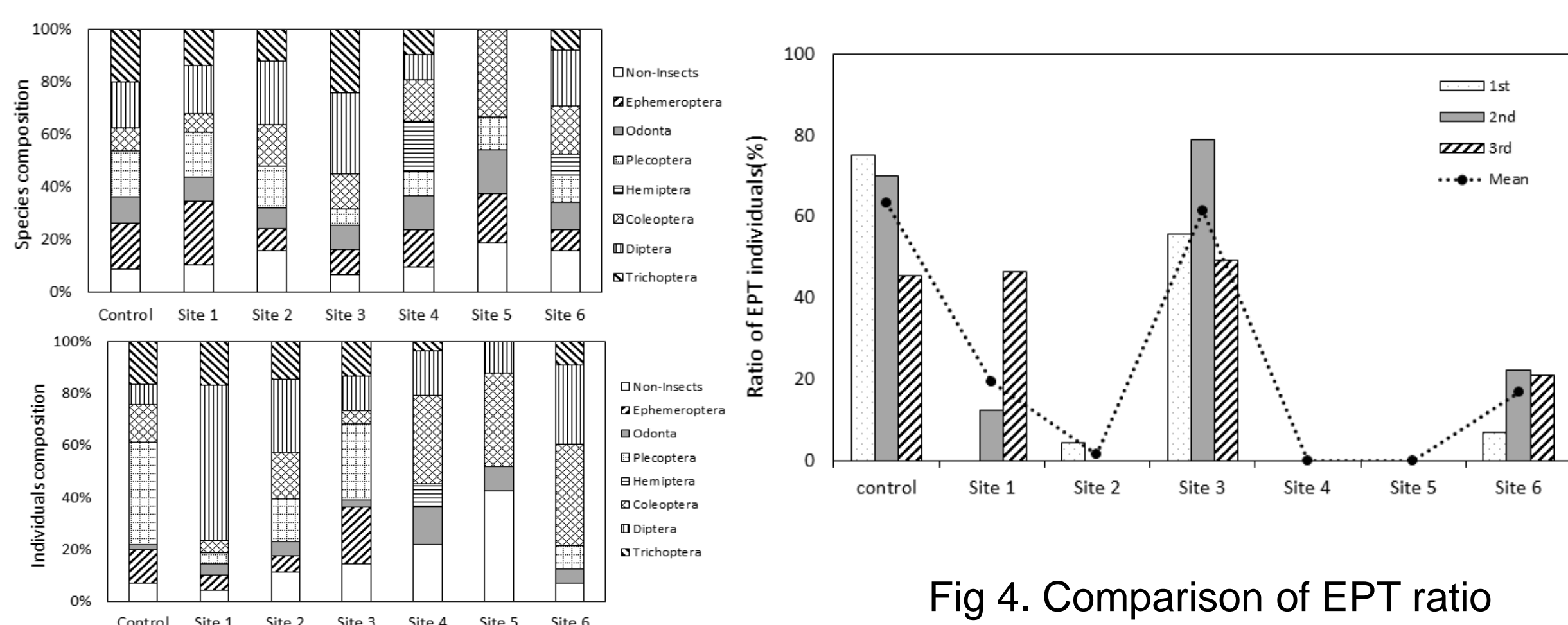


Fig 3. Composition of benthic macroinvertebrates community

3. The ecological score of benthic macroinvertebrate (ESB) showed the highest at site 3, while the lowest at biotope area. The stability and recovery of benthic macroinvertebrates showed different according to restoration types at forested bog. And biological evaluation of water quality had lower right after restoration and otherwise satisfactory on site 3. It was reduced by biological evaluation at after restoration in biotope area.

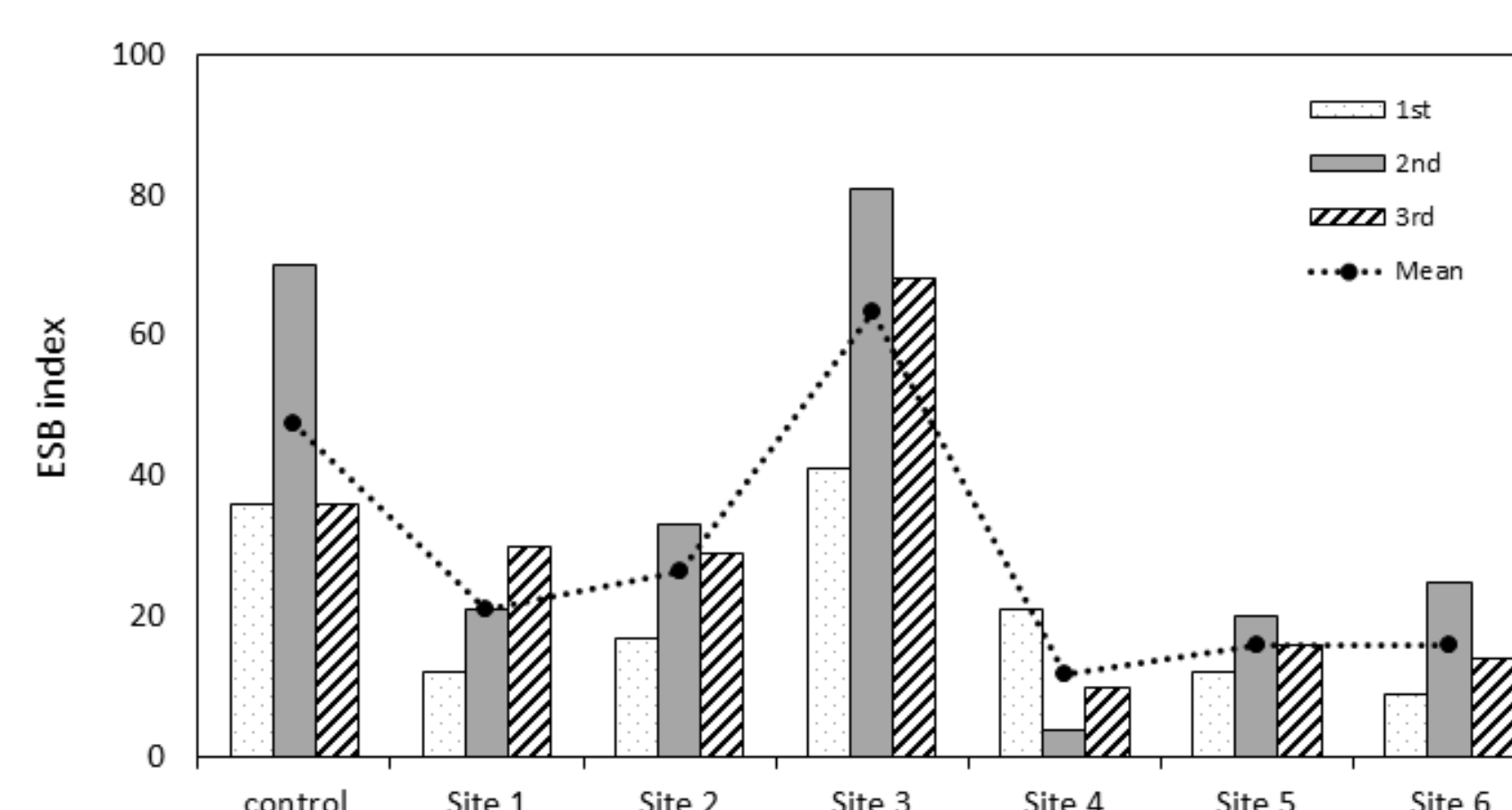


Fig 5. Comparison of ESB index

2. Considered by index, the dominance index (DI) was found the highest at the biotope area. The diversity index (H') and richness index (RI) were the highest at the control and Site 3. In Site 3, community index showed gradual recovery after construction. But, in biotope was increased after restoration, but other index showed unstable pattern.

Table 1. Biotic index of benthic macroinvertebrate

	H'			E			RI			DI		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
control	2.45	3.31	3.36	0.73	0.74	0.94	2.37	3.92	3.55	0.63	0.47	0.36
Site 1	2.05	1.22	3.33	0.88	0.40	0.96	1.82	1.55	3.00	0.66	0.88	0.32
Site 2	2.17	3.03	3.32	0.77	0.84	0.92	1.94	2.77	2.78	0.72	0.49	0.38
Site 3	3.22	3.74	4.06	0.84	0.81	0.91	3.68	4.99	4.99	0.44	0.40	0.26
Site 4	2.86	1.49	2.42	0.86	0.94	0.93	2.70	0.69	1.57	0.53	0.77	0.54
Site 5	2.29	2.47	2.68	0.88	0.78	0.89	1.69	2.05	1.89	0.57	0.59	0.47
Site 6	1.27	3.12	2.31	0.55	0.90	0.82	0.98	2.62	1.47	0.89	0.37	0.60

4. After restoration project, the benthic macroinvertebrates were observed to get recovery at Site 3, and to have the highest communities stability at control and Site 3. At biotope areas (Site 4, Site 5 and Site 6) communities stability were the lowest, but showed different community stability values according to the presence of water.

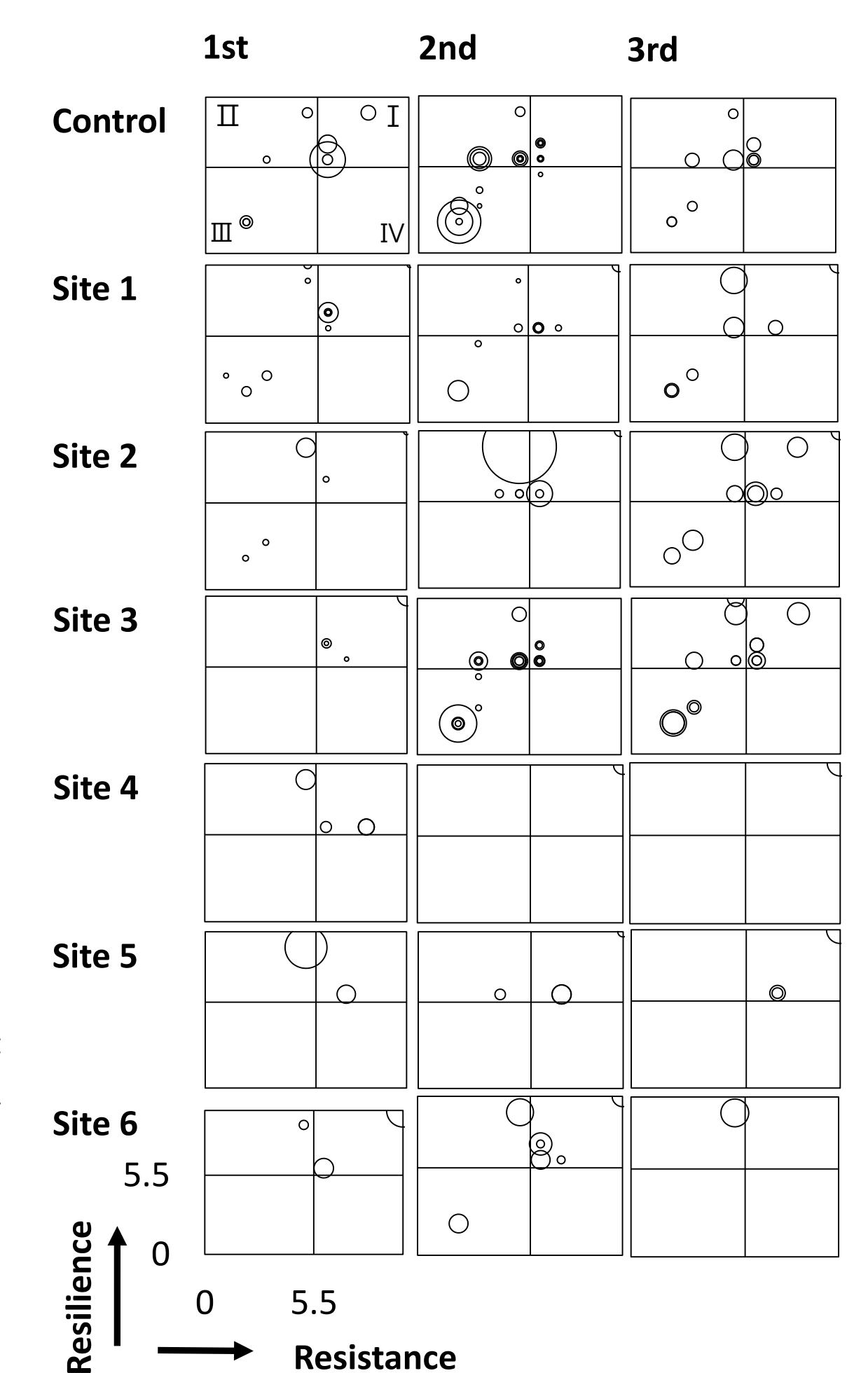


Fig 6. Analysis of community stability

It is confirmed that the eco-friendly restoration implements indeed provided the better environment for the inhabitation of benthic macroinvertebrate community. The change of community index depending on the restoration implements suggests that the eco-friendly restoration can provide a more suitable environment for benthic macroinvertebrate ecosystem that prefers the stream environment.