Community Loss Index (CLI) Analysis of Benthic Macroinvertebrates in Deogyusan National Park

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Ⅰ. INTRODUCTION

Deokyusan Mountain is an area where forest rivers, a source of the Geumgang River flowing north and Nakdonggang River flowing east, are located, and the water environment is comparatively good, so conservation of forests and rivers is absolutely important for water system protection. In particular, Forest rivers are an important source of biological resources for tributaries, tributaries, and main streams of the water system and are an important habitat for conservation and management of freshwater ecosystems of the same water system(Meyer et al., 2007). Benthic macroinvertebrates provide a source of food and are important members of aquatic ecosystems. They are considered as biological indicators because of their sensitivity to the organic content and toxic matter in the water (Hynes, 1963; Kehde and Wihm, 1972). This study aims to identify annual benthic macroinvertebrate fauna and community changes in the water system of Deokyusan National Park using the Community Loss Index (CLI) and use it as basic data to understand the aquatic environment of Deogyusan and iBenthic Macroinvertebrates community.

Ⅱ. Materials and Methods

1. Period and Surveyed sites

- **Period**

  Survey for 3 years (2019–2021), 3 times a year (Table. 1).

- **Surveyed sites**

  8 sites of Deogyusan National Park (Fig. 1).

  St.1 Downstream of Naechang Village , St.2 Suseongdae,
  St.3 Susimdae , St.4 Ojeolli Hadan, St.5 Inwoldam
  St.6 Guwoldam, St.7 Geumpotan St.8 Wontongsa

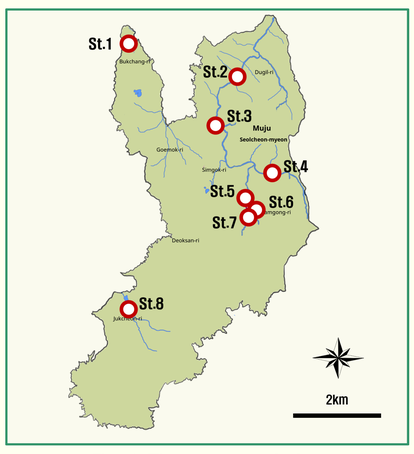


Fig. 1. The surveyed site.

Table. 1. The Dates of the surrveys

	Date of the surveys
1st	25. Apr. ~ 26. Apr. 2019
2nd	09. Jul. ~ 10. Jul. 2019
3rd	10. Oct. ~ 11. Oct. 2019
4th	23. Apr. ~ 24. Apr. 2020
5th	10. Sep. ~ 11. Sep. 2020
6th	15. Nov. ~ 16. Nov. 2021
7th	29. Apr. ~ 30. Apr. 2021
8th	26. Jul. ~ 27. Jul. 2021
9th	03. Nov. ~ 04. Nov. 2021

2. Collection and Identification

- **Quantitative collection**

  Collect 3 times, using a Surber sampler (30*30cm, 1mm net)

- **Qualitative collection**

  Collect using hand net and tweezers

3. Analytical methods

- **Functional Feeding Groups (FFGs)**

  Functional Habitat Groups (FHGs): Ro & Jeon (2004)

- **Community analysis**

  DI (Dominance index) : McNaughton (1967)
  H´ (Species diversity index) : Shannon–Weaver (1949)
  R´ (Species richness index) : Margalef (1958)
  J´ (Evenness index) : Pielou (1975)

- **Aquatic ecosystem health assessment**

  The aquatic ecosystem health was evaluated by applying the benthic macroinvertebrate index (BMI).

- **Community Loss Index (CLI)**

  Community Loss Index (CLI) : Courtemanch and Davies (1987).
  The analysis compared 2019 and annual species.

- **Common species analysis**

  Plot annual common species using Venn Diagram Plotter ver. 1.5.5228.29250

Ⅲ. Results

1. Species composition

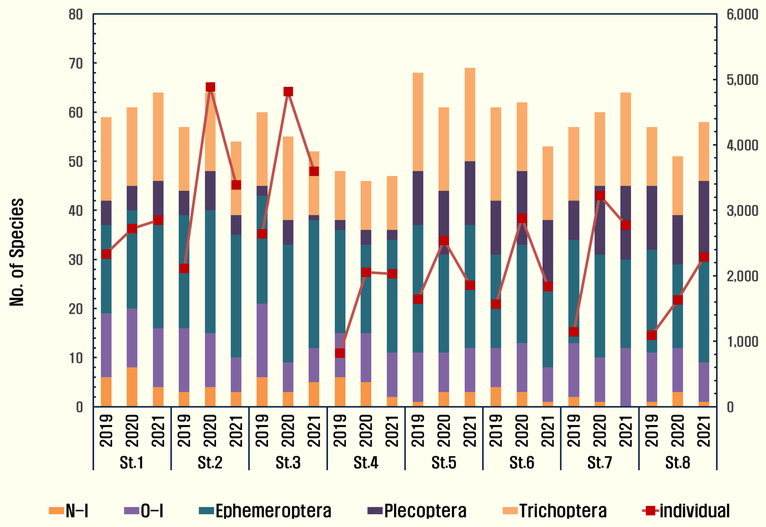


Fig. 2. The individuals ratio and species number of in each surveyed site.

2. Functional feeding group

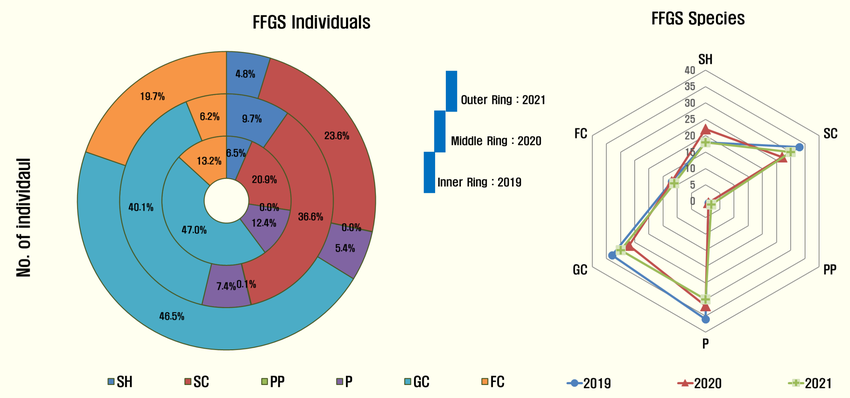


Fig. 3. The Functional feeding group compositions of surveyed species (left) and individuals (right) in each years.

SH : Shredder SC : Scraper PP : Plant-Piercer P : Predator
GC : Gathering-Collector FC : Filtering-Collector

3. Community analysis

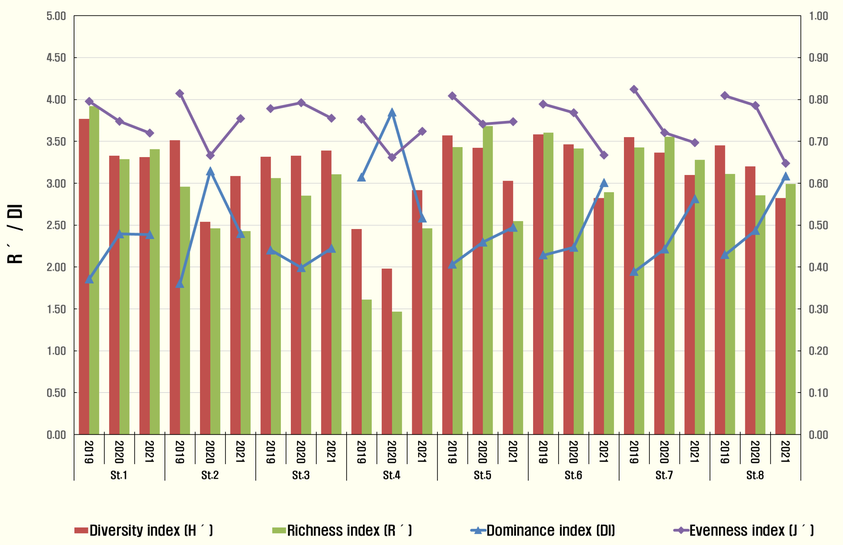


Fig. 4. Biological indices of benthic macroinvertebrates in each surveyed site.

4. Aquatic ecosystem health assessment

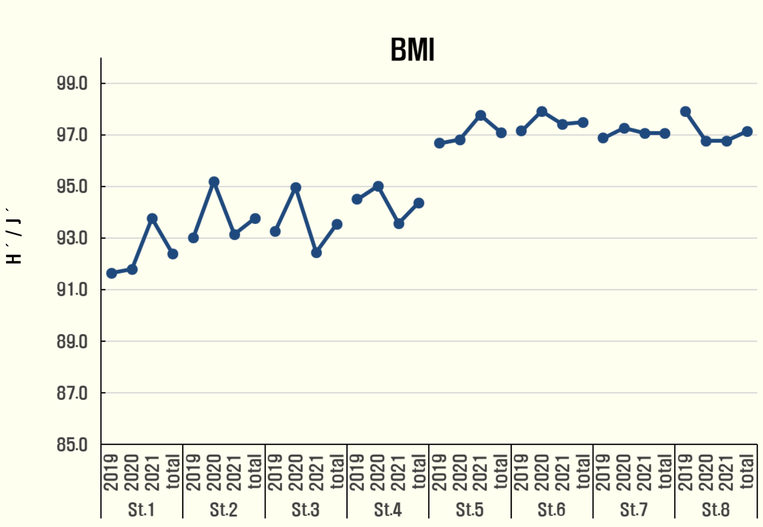


Fig. 5. Benthic macroinvertebrate index (BMI) in each surveyed site.

5. Community Loss Index (CLI)

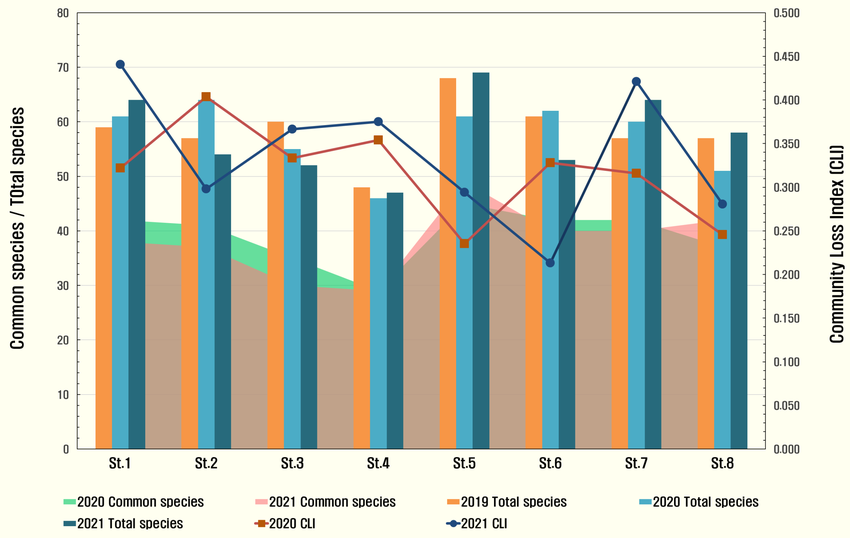
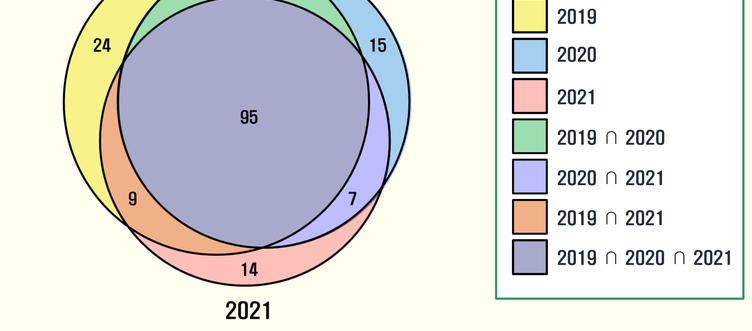


Fig. 6. Community Loss Index of benthic macroinvertebrates in each surveyed site.

6. Common species analysis



2019 ∩ 2020 ∩ 2021 = 95
2019 ∪ 2020 ∪ 2021 = 174

Fig. 7. Venn diagram of common species for each surveyed years.

IV. CONCLUSION

1. The E.P.T. group had a high species share of 72.31(±1.29)% on average, and that the water environment remained stable without significant annual fluctuations.
2. As a result of the FFG analysis, the number of individuals was highest in SH, and the number of species was highest in P over the entire survey year.
3. Community analysis, the dominance index (DI) was highest at 0.53 on average in 2021, while the average diversity index (H´), abundance index (R´) and evenness index (J´) were the highest at 3.40, 3.14, and 0.80,
4. As a result of the evaluation of the health of the aquatic ecosystem, all points were rated 'A' with a score of 90 or higher, and the average score was 95.4 (±2.5).
5. As a result of analyzing the Community Loss Index (CLI) it was confirmed that the annual pattern of species appearance was similar, with a CLI of 0.11 in 2020 and 0.13 in 2021.
6. The number of common species by surveyed year was total 95 species.