이안천의 식생분포

Distribution of riparian vegetation in Ian Stream

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Abstract

The complex vegetation and plant species distributions within riparian corridors influence plant species diversity patterns at both local and regional scales and further reflect both natural and anthropogenic disturbances. Because of these characteristics, riparian zones are often the ecosystem level component that are most sensitive to changes of the surrounding environment; they provide early indications of environmental change and can be viewed as the important source in the watershed. The objectives of this study were two concepts: first, document the composition and dominance of plant communities of riparian areas in the stream, second, compare species composition and temporal diversity between stations in riparian areas of the Ian Stream. The flora was composed to total 158 kinds of the vascular plants as 49 family, 54 genera, 145 species, 12 varieties, 1 forma. When the naturalized plant were applied to the recent classification system 280 kinds, the naturalization rate was 10.8% higher than that of mean value(10.3%) of the Korean mountain district. Furthermore, urbanization index (UI) was 6.1%. The dominant vegetation communities were distributed in the habitats of three compartments from upstream to downstream. The vegetations were included *Phragmites japonica*, *Salix gracilistyla*, *S. hulteni* and *Robinia pseudo-acacia* in the riparian area, and *Persicaria sieboldii*, *Stellaria alsine* var. *undulata*, *Draba nemorosa* var. *hebecarpa*, *Capsella bursa-pastoris*, *Lepidium apetalum*, *Bidens frondosa*, *Trigonotis peduncularis* and *Hemistepta lyrata* in the sandbank or the riparian area, and *Equisetum arvense*, *Humulus japonicus*, *Persicaria perfoliata*, *Trifolium repens*, *Artemisia princeps* var. *orientalis*, *Lactuca indica* var. *laciniata*, *Avena fatua*, *Agropyron yesoense*, *Oenothera odorata*, *Viola mandshurica*, *Rumex crispus* in banksides, respectively.

Key words: Ian Stream, riparian [1]vegetation, flora, exotic plants

1. INTRODUCTION

Riparian vegetation structure, composition and dynamics have received growing attention in the past decade (Malanson, 1993; Nilsson *et al.*, 1994). Riparian systems are aquatic-terrestrial ecotones with unique biotic, biophysical and landscape characteristics (Naiman and Decamps, 1997;Wiens, 2002). Riparian plant communities perform an array of important ecosystem functions, including stream bank stabilization , thermal regulation of streams, filtering and

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retention of nutrients (Vought *et al.*, 1994), provision of critical wildlife habitat, and maintenance of ecosystem stability (Wiens *et al.*, 1985). Given their uniqueattributes, characterizing the composition and structure of riparian vegetation are integral components of riparian protection and conservation efforts (Naiman and Decamps, 1997). Vegetation in riparian zones commonly occurs within a diverse mosaic of landforms, communities, and environments within the larger landscape (Wiens, 2002). Riparian plant communities are typically composed of specialized and disturbance-adapted species within a matrix of less-specialized and less frequently disturbed plant species (Naiman *et al.*, 1998).

The complex vegetation and plant species distributions within riparian corridors influence plant species diversity patterns at both local and regional scales and further reflect both anthropogenic and natural disturbances. Becauseof these characteristics, riparian zones are often the ecosystem level component that are most sensitive to changes within the surrounding environment; they provide early indications of environmental change (Decamps, 1993) and can be viewed as the focal point of watersheds (Naiman and Decamps, 1997).

One key disturbance impacting riparian systems is the invasion of non-native plant species many of which have been shown to significantly impact the composition and diversity of native plant communities (Lodge, 1993). Several interactive processes appear to control the establishment and spread of non-native species in riparian systems (Decamps *et al.*, 1995). Riparian corridors may be especially susceptible to invasion due to the substantial environmental heterogeneity created by the moderate flooding that occurs naturally in these systems (Naiman and Decamps, 1997).

2. MATERIALS AND METHODS

All field data collection was completed between April and November in 2004. Riparian vegetation was quantified by analyzing land area within about 1.5 km each sites along Ian stream. Floristic survey were walked across each sites, recording all species observed until no more new species were found. We wanted to determine if and how disturbance level in the riparian corridor, defined by existing land cover, might be influencing patterns of both native and non-native species.

Transects are the recommended sampling method where communities are thought to be strongly influenced by an environmental gradient. The percent cover of each species was calculated for theplot as the mean cover recorded from among the total number of subplots. Species fidelity was defined as the number of plots in which each species occurred divided by the total number of plots.

3. RESULTS

The flora was composed 49 family, 54 genera, 145 species, 12 varieties, 1 forma or total 158 kinds of the vascular plants(Table 1, Figure 1).

The dominant vegetation communities were *Phragmites japonica*, *Salix gracilistyla*, *S. hulteni, Robinia*

pseudo-acacia communities distributed in riparian area. *Persicaria sieboldii*, *Stellaria alsine* var. *undulata*, *Draba nemorosa* var. *hebecarpa*, *Capsella bursa-pastoris*, *Lepidium apetalum*, *Bidens frondosa*, *Trigonotis peduncularis* and *Hemistepta lyrata* communities that annual or herbaceous species are distributed in sandbank or riparian area. *Equisetum arvense*, *Humulus japonicus*, *Persicaria perfoliata*, *Trifolium repens*, *rtemisia princeps* var. *orientalis*, *Lactuca indica* var. *laciniata*, *Avena fatua*, *Agropyron yesoense*, *Oenothera odorata*, *Viola mandshurica*, *Rumex crispus* appeared mainly in bank sides.

Table 1. Different appearance flora of Investigation sites in Ian stream

Site	Family	Genera	Species	Variety	Forma	Total	Exotic plants
S1	43	85	95	7	-	103	9
S2	30	75	85	7	-	92	14
S3	27	56	72	5	-	77	10
S4	24	54	62	7	1	70	12
S5	25	52	61	7	-	68	9
S6	25	54	58	7	-	65	10
S7	23	51	54	6	-	60	10
Total	49	54	145	12	1	158	17

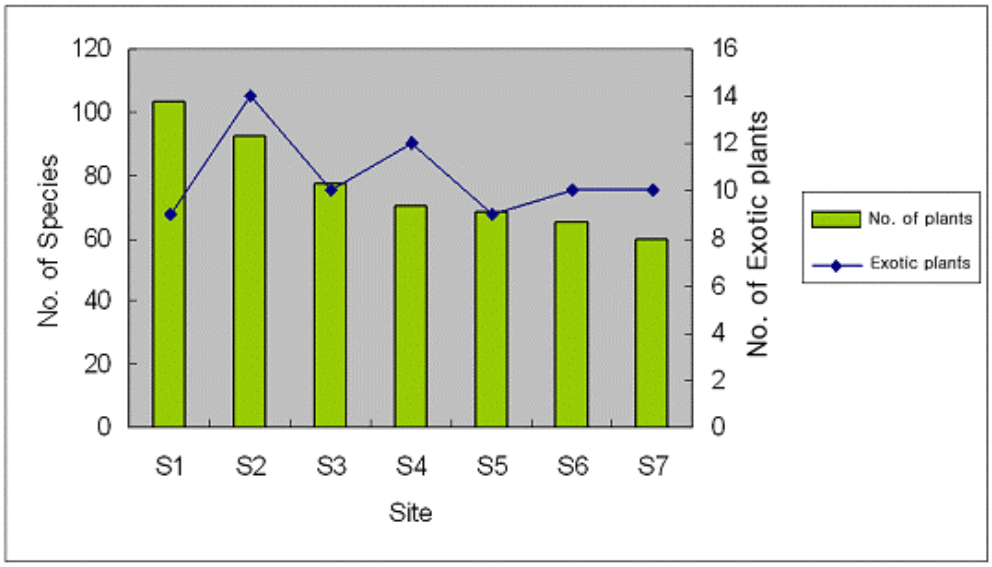

Fig. 1. Different appearance flora and exotic plants of Investigation sites in Ian stream

3.1 Specific and exotic plants

4 kinds of Ministry of Environment grade species appear at investigation sites. *Aristolochia contorta* is distributed in bank site of S4, and *Salix grandulosa* appeared in all area except S2 and S4. *Alnus hirsuta*appeared in bank sides of S2 and S3 that range mainly on middle part of Korea. *Penthorum chinense* uniquely in S1.

In case naturalized plant applies the recent classification system 280 kinds (Koh *et al*, 2002), the naturalization rate is 10.8%, but if compare with average naturalization rate (NR) 10.3% (Lee and Jeon, 1995) of our country mountain district, and urbanization index (UI) is 6.1%(Table 2, Figure 2).

Table 2. Urbanization index(UI), naturalized ratio(NR) and exotic plants of investigation sites in Ian stream

Site	S1	S2	S3	S4	S5	S6	S7	Total
Total number of plants	103	92	77	70	68	65	60	158
No. of exotic plants	9	14	10	12	9	10	10	17
UI	3.2	5.0	3.6	4.3	3.2.	3.6	3.6	6.1
NR	8.7.	15.2.	13.0	17.1.	13.2.	15.45	16.7	10.8

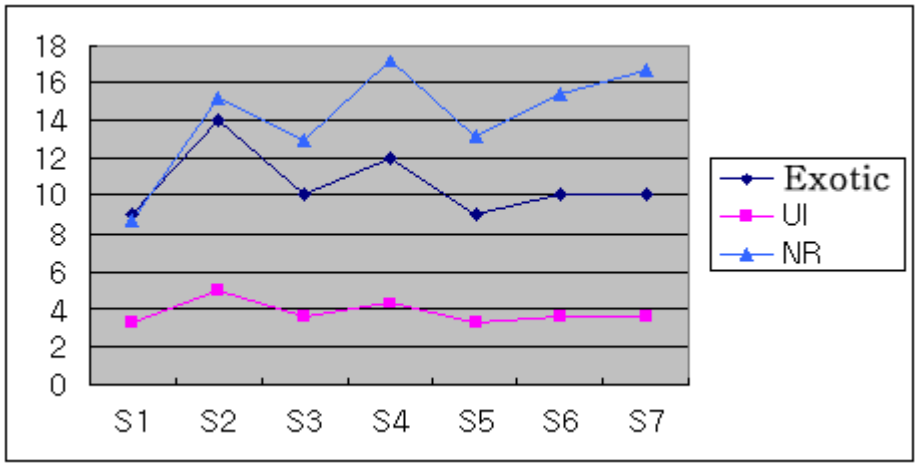

Fig. 2. Spatial distribution of UI, NR and number of exotic plants in Ian stream

3.2 Vegetation

Physiognomical vegetation mapping for each sites in Ian stream. Compared number of vegetation piece to landscape ecology analyze each sites. Number of vegetation piece that appear in whole 7 sites is 183, riparian vegetation community except land plant community of these displayed whole 98.9% as 181 all among them.

Among the communities, the *Phragmites japonica* community was occupied most wide area to 42.5% by 76 piece and the next wide area was occupied S*alix gracilistyla* community(35.8% by 67 piece), Carex dispalata community(26.0% by 26 piece) and *Persicaria thunbergii* community(1.1% by 3 piece). Additional *Rumax crispus*, *Veronica anagallis-aquatica*, *Persicaria sieboldii*, *Phragmites japonica - Carex dispalata* community appeared each 1 times.

Table 3. Area of Landscape vegetation and number of vegetation piece of investigation sites in Ian stream(parenthesis : vegetation number of piece)

Community	St.1	St.2	St.3	St.4	St.5	St.6	St.7	ratio
Phragmites japonica	50.9(9)	23.1(14)	50.8(14)	35.5(13)	55.4(9)	63.2(5)	83.1(12)	49.51 (42.5)
Salix gracilistyla	30.3(8)	42.5(16)	42.9(15)	26.6(10)	23.3(4)	36.8(10)	5.0(4)	28.68 (35.8)
Carex dispalata	12.9(10)	7.0(7)	6.2(2)	16.4(6)	8.2(2)	-	-	6.88 (14.5)
Phalaris arundinacea	3.5(1)	-	-	-	13.2(2)	-	-	1.94 (1.7)
Chenopodium album var. *centrorubrum*	0.6(1)	-	-	-	-	-	1.8(1)	0.48 (1.1)
Persicaria thunbergii	0.4(2)	0.3(1)	-	-	-	-	-	0.15 (1.1)
Rumax crispus	0.6(1)	-	-	-	-	-	-	0.09 (0.6)
Veronica anagallis-aquatica	0.3(1)	-	-	-	-	-	-	0.04 (0.6)
Persicaria sieboldii	0.3(1)	-	-	-	-	-	-	0.04 (0.6)
Phragmites japonica-Carex dispalata	-	-	-	21.5(1)	-	-	-	2.01 (0.6)
physical park ect.	-	-	-	-	-	-	10.2(1)	2.26 (0.6)
arable land	-	27.1(1)	-	-	-	-	-	7.92 (0.6)
Total	100.0 (34)	100.0 (38)	100.0 (31)	100.0 (30)	100.0 (17)	100.0 (15)	100.0 (18)	100.0

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