



Priority for Re-wild of Abandoned Land to Enhance Biodiversity in Agricultural Landscapes



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Main Conclusions

- We tried to find a priority area among abandoned lands to re-wild to increase biodiversity in agricultural landscapes. As the results, the abandoned land around the ecological important area (EIA) appears to be a suitable area for re-wild for the future. The interior of the abandoned land contained relatively more natural land cover, and as a result of checking the external land cover, the proximity to the natural land cover was also high. However, since the characteristics of abandoned land differ depending on the region, strategies fitted to the region may be required. Compared to the evaluation results in the development aspect (land suitability), the distance from the road and the proximity from the building area are considered for development, but the proximity and connectivity with the natural area are not considered in the conservation aspect, so it can be complemented through the methodology of this study.

Objectives

- South Korea is one of the countries with a very high rate of population decline. The areas most affected by population decline are rural areas. Even now, there are many abandoned lands in rural areas. There are conflicting opinions about the ecological value of abandoned lands
- In landscape ecology, there are previous results that increase the heterogeneity of the landscape so that various species can inhabit or have a positive effect on the surrounding biodiversity.
- Therefore, we tried to find a priority area among abandoned lands to re-wild to increase biodiversity in rural areas. In particular, the value of abandoned lands as a buffer areas that can contribute to conserving areas with ecological important areas(EIA).

Overview and Study sites

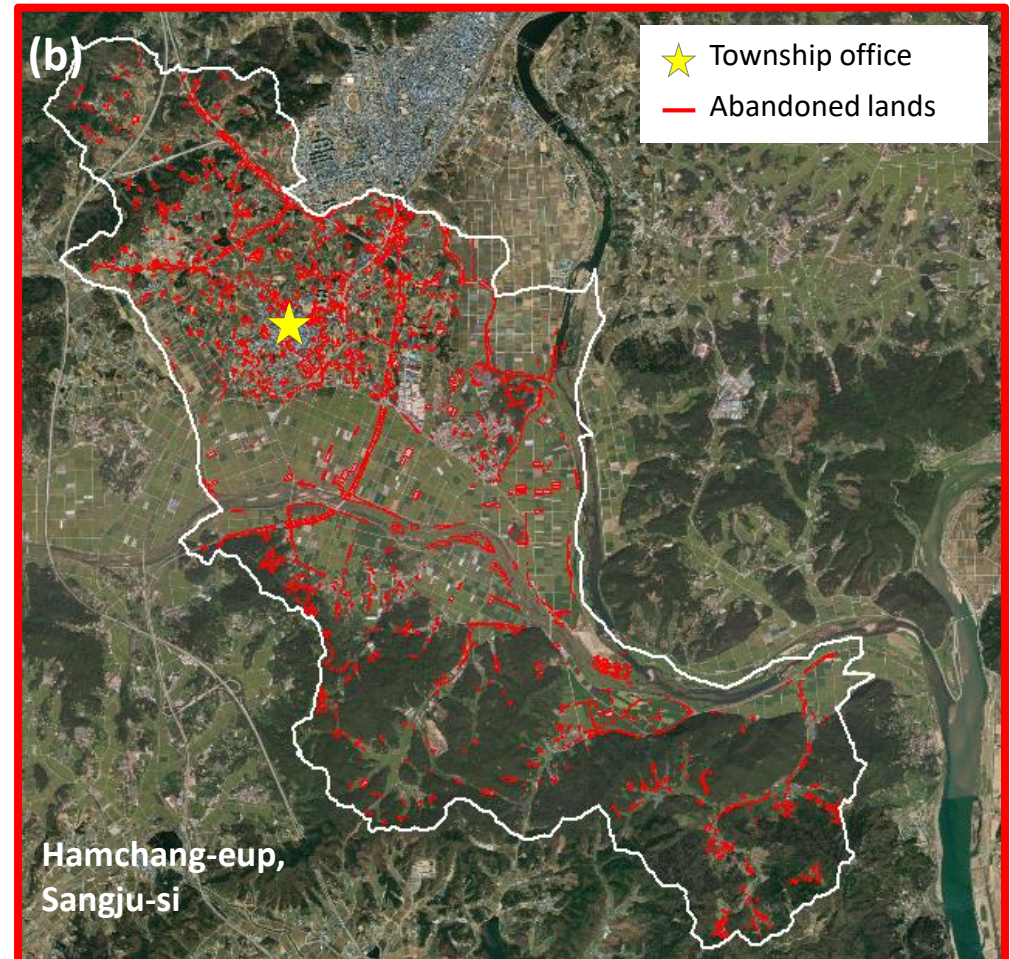
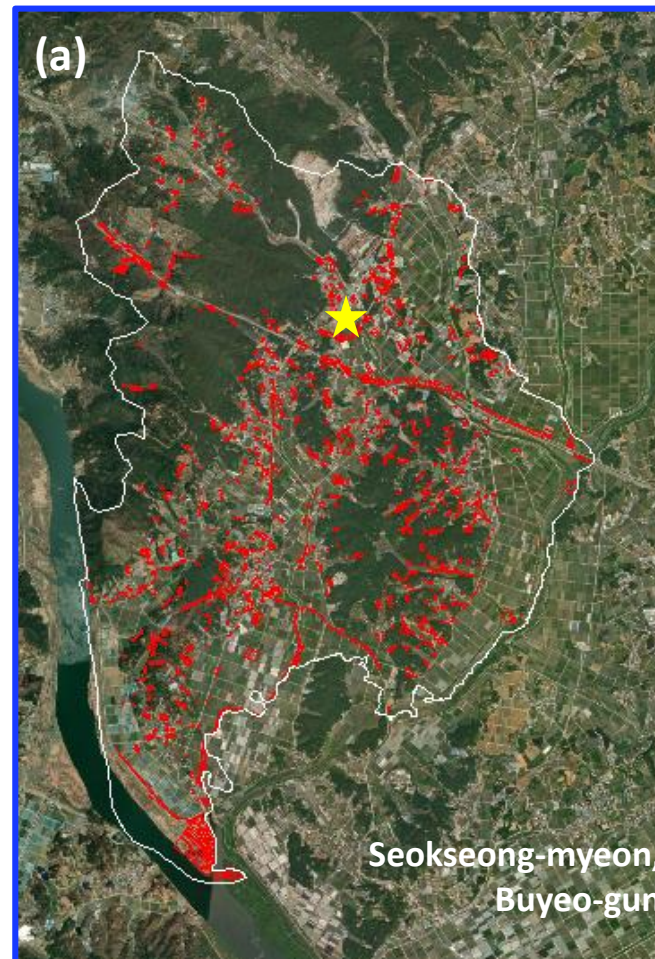
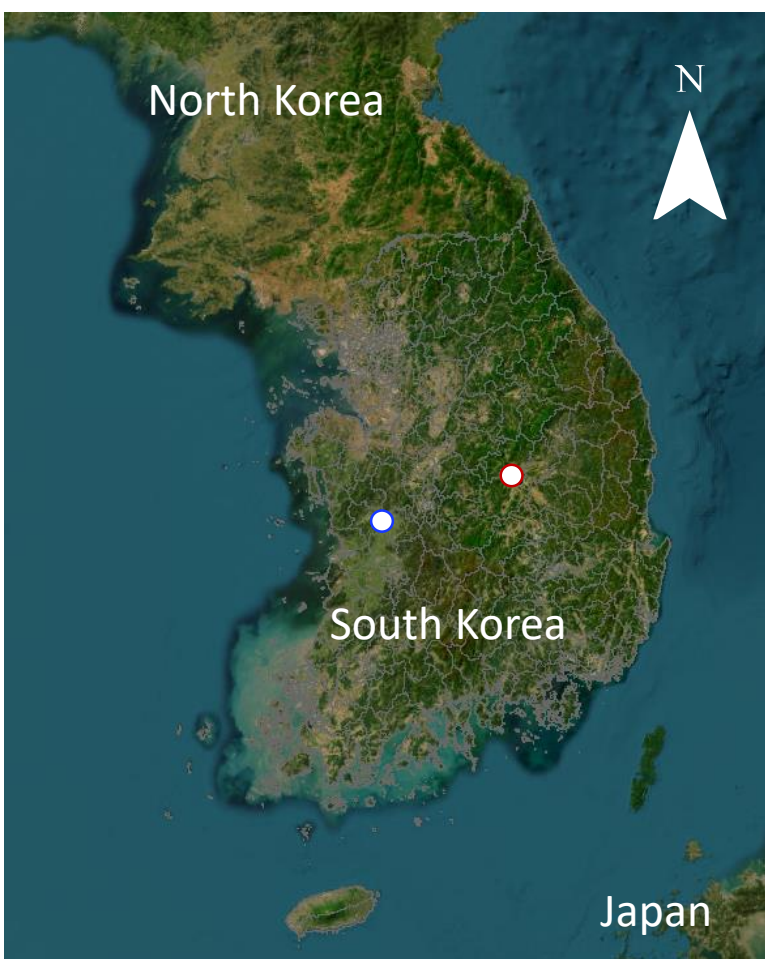


Fig 1. Study sites in South Korea, (a) Seokseong-myeon, Buyeo-gun, Chungcheongnam-do, (b) Hamchang-eup, Sangju-si, Gyeongsanbuk-do

- We tried to select an area where there was a difference in the caused of abandoned lands as the study sites. Specifically, Seokseong-myeon (Buyeo-gun) where land use changes have been occurring due to a rapid population decline in the agricultural township location, and Hamchang-eup (Sangju-si) where the central function of the township location is weakening due to the development of the downtown area in the region.
- Firstly we confirmed the re-wild potential of the abandoned land by checking the current land cover area ratio in the abandoned land in order to grasp the status of the abandoned land. Second, the re-wild priority was derived using the Matrix methodology. We synthesized the result of land suitability evaluation (land suitability index) and priority derived based on proximity to EIA (ecologically natural map 1st grade, national land environmental assessment map 1st grade, and biotope map 1st grade). Finally, we verified by analyzing the land cover ratio and the distance from the surrounding land use for each priority region, and conducting a field survey.

Methods

➤ Research Flow

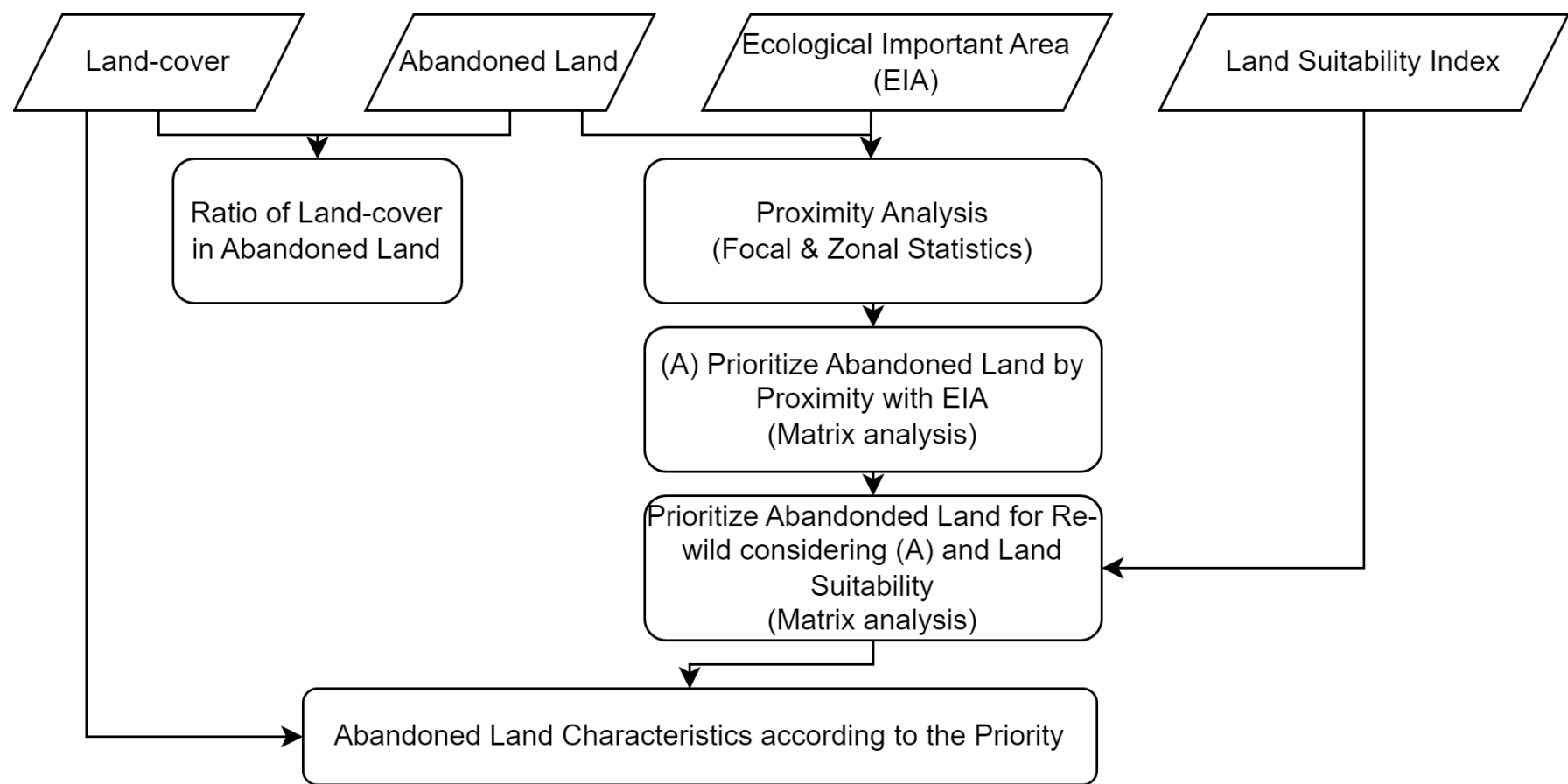


Fig 2. Research flow

➤ Priority for Re-wild considering EIA and Land Suitability

- Proximity to EIA (A in Fig.2) and land suitability index were synthesized by evaluating land use potential based on three groups of Re-wild, Agriculture, and Development through matrix analysis to prioritize.

		Proximity with EIA				
		I	II	III	IV	V
Land Suitability	A	1) Re-wild				
	B	2) Re-wild or Agriculture				
	C				4) Agriculture or Development	
	D	3) Agriculture				
	E				5) Development	

Fig 3. Priority Matrix Analysis

Results

➤ Ratio of Land-cover in Abandoned Land

- Abandoned lands show various land cover conditions (Fig 4). The large proportions were roads, forests, agricultural lands, other grasslands, and inland wetlands (Table 1).

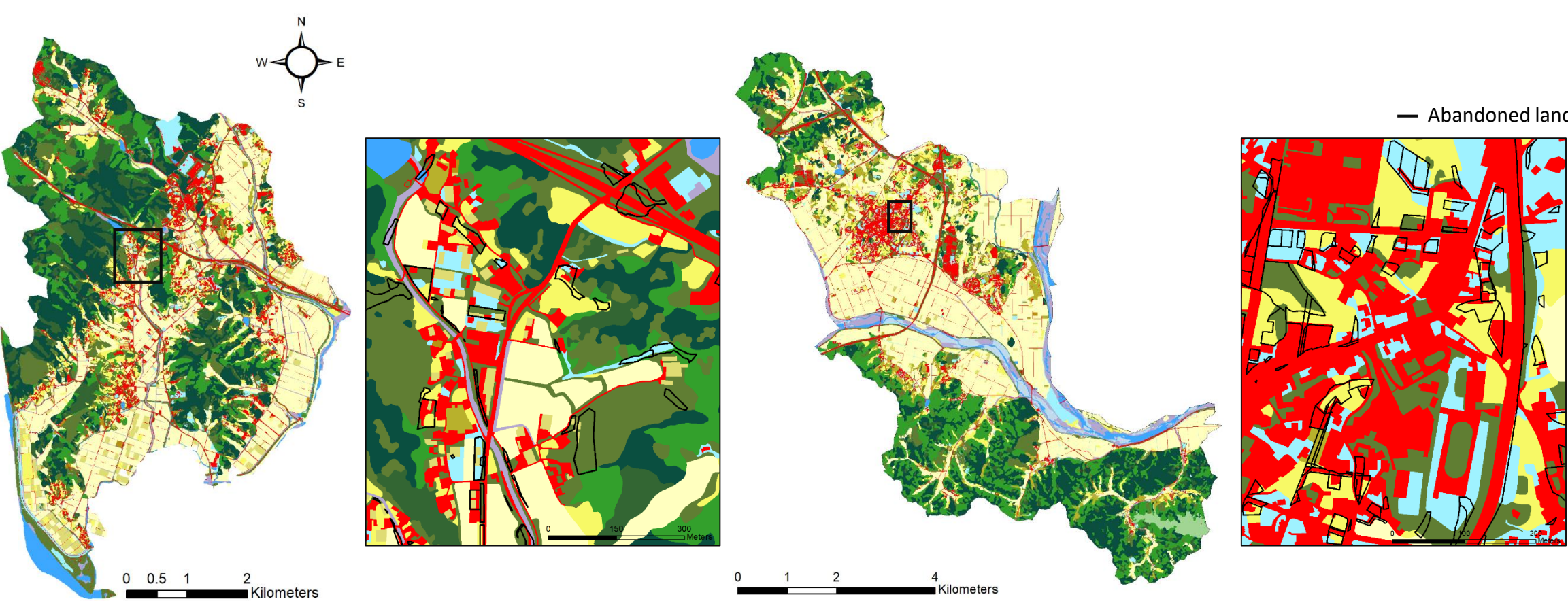


Fig 4. Land-cover sub category and abandoned land in the study sites

Table 1. Rank of included ratio of land-cover in the abandoned lands

Rank	Sub category	Seokseong-myeon				Sub category	Hamchang-eup			
		Parcels	Ave. %	Std	Max %		Parcels	Ave. %	Std	Max %
1	Dairy Farm	250	51.67	38.45	100	Deciduous Forest	114	46.3	34.1	100
2	Cultivated Dry Field	28	40.81	34.51	100	Dairy Farm	153	45.3	39	100
3	Inland Wetland	12	38.41	31.43	80.6	Lake	269	44.9	38	100
4	Deciduous Forest	75	37.78	35.9	100	Mixed Forest	359	44.5	40.8	100
5	Schoolyard	200	37.68	36.74	100	Evergreen Forest	3	42.6	29.8	77.6
6	Riverside	1,265	35.63	32.79	100	Other Grasslands	31	41.6	41.3	100
7	Cultivated Paddy	3	33.49	56.74	99	Environmental Facility	416	40.7	37.1	100
8	Road	816	33.23	28.98	100	Road	1,686	38.8	32.7	100
9	Not-Cultivated Paddy	199	33.23	32.59	100	Barren	595	35.9	35.7	100
10	Other Grasslands	130	33.09	32.16	100	Grave	1,563	35.3	32.1	100

➤ Priority for Re-wild considering EIA and Land Suitability

- The area of the grade with development potential with low priority was the largest, and the area of the Re-wild was small. The closer to the township location, the more development, and the further away, the more Re-wild tends to appear (Fig 5). It was found that there are more abandoned lands with bigger potential for development compared to Re-wild.

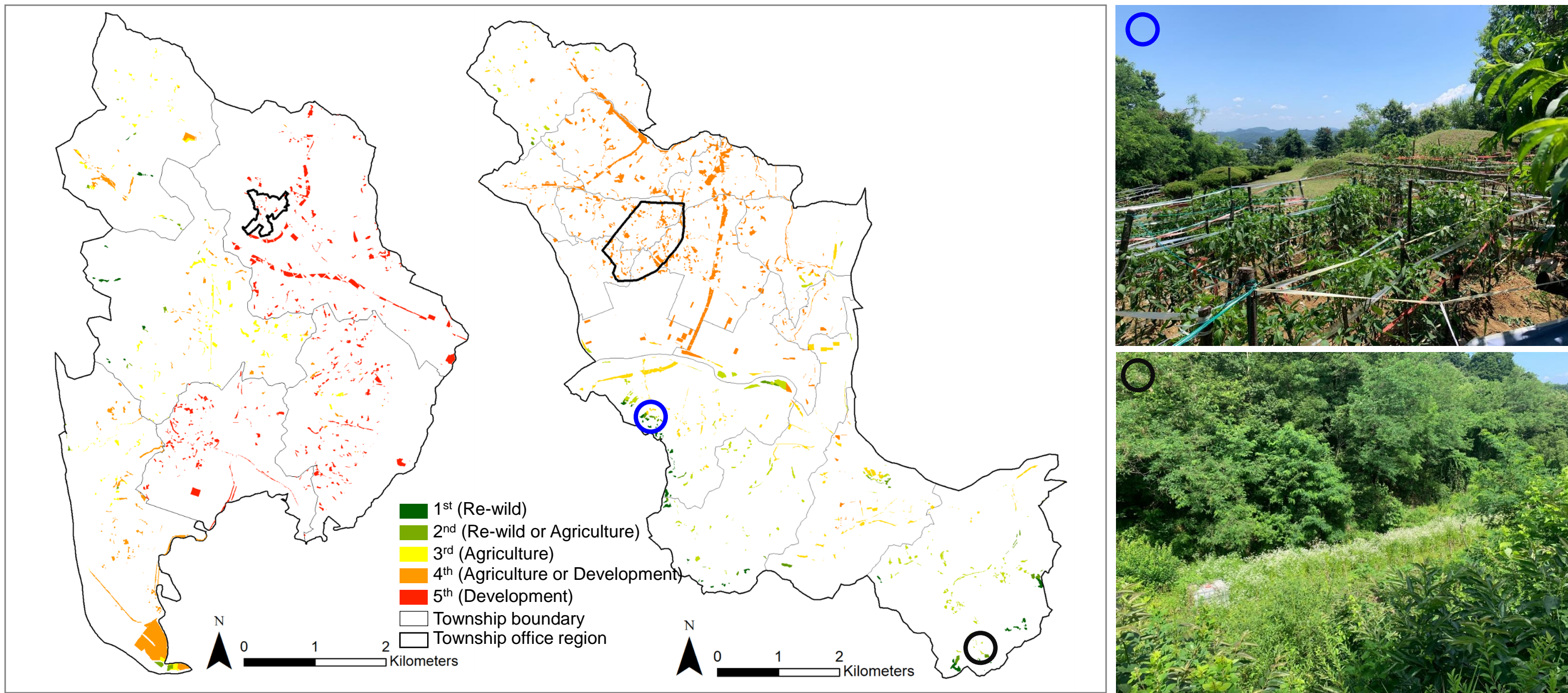


Fig 5. Priority for Re-wild considering EIA and Land Suitability (left) and the Abandoned Lands in the Field Survey (right)

➤ Abandoned Land Characteristics by the Priority

- It can be seen that areas with a high priority for Re-wild have a relatively high area ratio of natural land cover compared to areas with a low priority. For built up land cover, low priority areas have a higher land cover area ratio. However, these trends were different depending on the region (Table 2).
- Overall, the distance from residential or agricultural areas tends to decrease as the priority is lower, and for forests, areas with lower priority tend to have longer distances (Table 3).

Table 2. Included ration of land-cover in the priority of abandoned lands (red : increase, blue : decrease)

Main category	Sub category	Seokseong-myeon					Hamchang-eup				
		1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th
Used Area (Built up)	House	0.03	37.70	15.96	20.09	25.69		12.89	19.39	22.42	30.39
	Road	34.08	15.73	37.14	18.79	36.92	13.04	11.56	34.59	38.67	39.48
Agricultural Land	Not-cultivated Paddy		45.95	32.94	15.74	23.31	71.39	65.15	49.18	30.04	33.44
	Not-cultivated Dry Field	32.32	94.81	30.59	31.54	29.07	63.21	33.73	44.58	31.98	32.39
Forest	Deciduous Forest	34.76	54.60	55.36	50.19	51.31	69.21	30.32	40.01	40.19	38.00
	Evergreen Forest	16.23	58.84	34.86	38.76	38.07	26.02	21.83	16.48	16.62	14.97
Grass	Other grasslands	34.63	50.33	42.77	39.06	31.46	43.49	43.52	39.05	38.51	33.55
Wetland	Inland Wetland		24.73	29.11	18.21	30.89		77.62	40.98	49.31	37.30
Barren	Barren			30.85	40.14	26.51	0.06	18.59	31.87	45.76	32.84

Table 3. Distance from the land-use according to the priority of abandoned lands (red : increase, blue : decrease)

Main category	Seokseong-myeon					Hamchang-eup				
	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th
Residential area	283.51	216.56	118.27	182.33	102.28	237.26	165.19	190.62	238.50	104.15
Agricultural area	273.09	206.94	69.22	92.09	55.56	115.84	142.27	115.46	49.43	68.08
Forest	1.02	50.85	76.29	155.88	79.99	0.61	133.29	63.69	186.05	156.48
Water	627.90	393.79	431.35	248.91	310.64	650.06	408.5	382.43	287.37	634.62
Road	-	-	-	-	-	-	-	-	-	-

Discussions

- The abandoned lands located around EIA appear to be suitable areas for Re-wild. The proximity to the natural land cover was high, and the natural land cover was relatively more distributed inside the abandoned lands. However, since the characteristics of abandoned lands are different for each region, it is necessary to check the distribution characteristics of abandoned lands by region.
- Land suitability evaluation considers proximity from just the development site, such as distance from roads, but it does not include the concepts of proximity and connectivity with natural areas. Therefore, if the land suitability index is complimented using the abandoned land priority developed in this study, areas with ecological potential can be found for the re-wild.