Climate Change Impact Assessment using the MOTIVE Ecosystem

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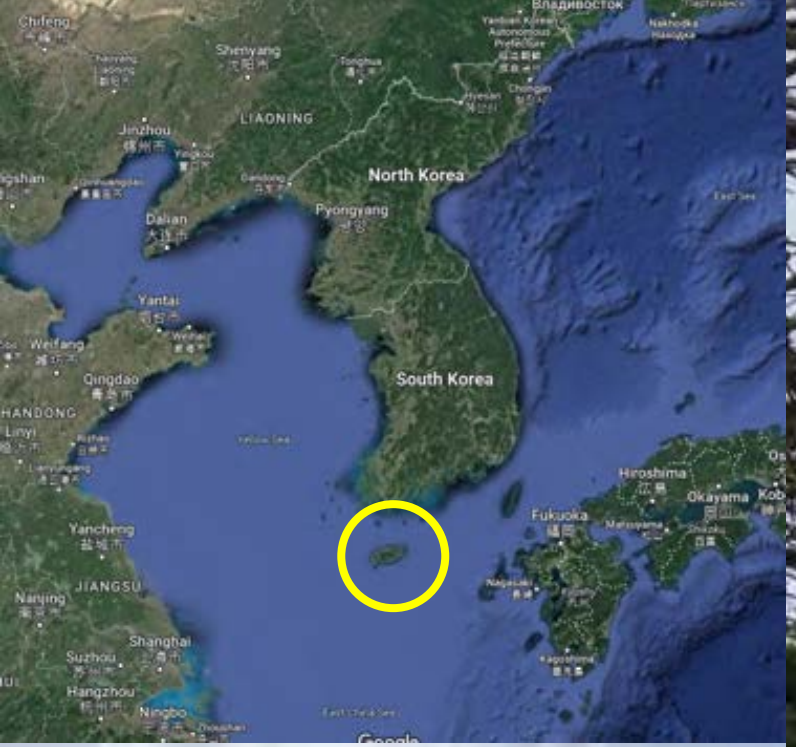
Background

South Korea have adopted a **climate change impact assessment** in EIA process to figure out its resilience to climate change and to reduce the impact of development under climate change.

The Purpose of Study

- To apply the developed a **climate change impact assessment model for ecosystem** (the MOTIVE Ecosystem) to **Climate Change Impact Assessment** (CCIA) process in South Korea

- **The MOTIVE Ecosystem** is a climate change impact and vulnerability assessment model for ecosystem such as climate sensitive species, invasive species and vulnerable habitats.


Chifeng
Shenyang
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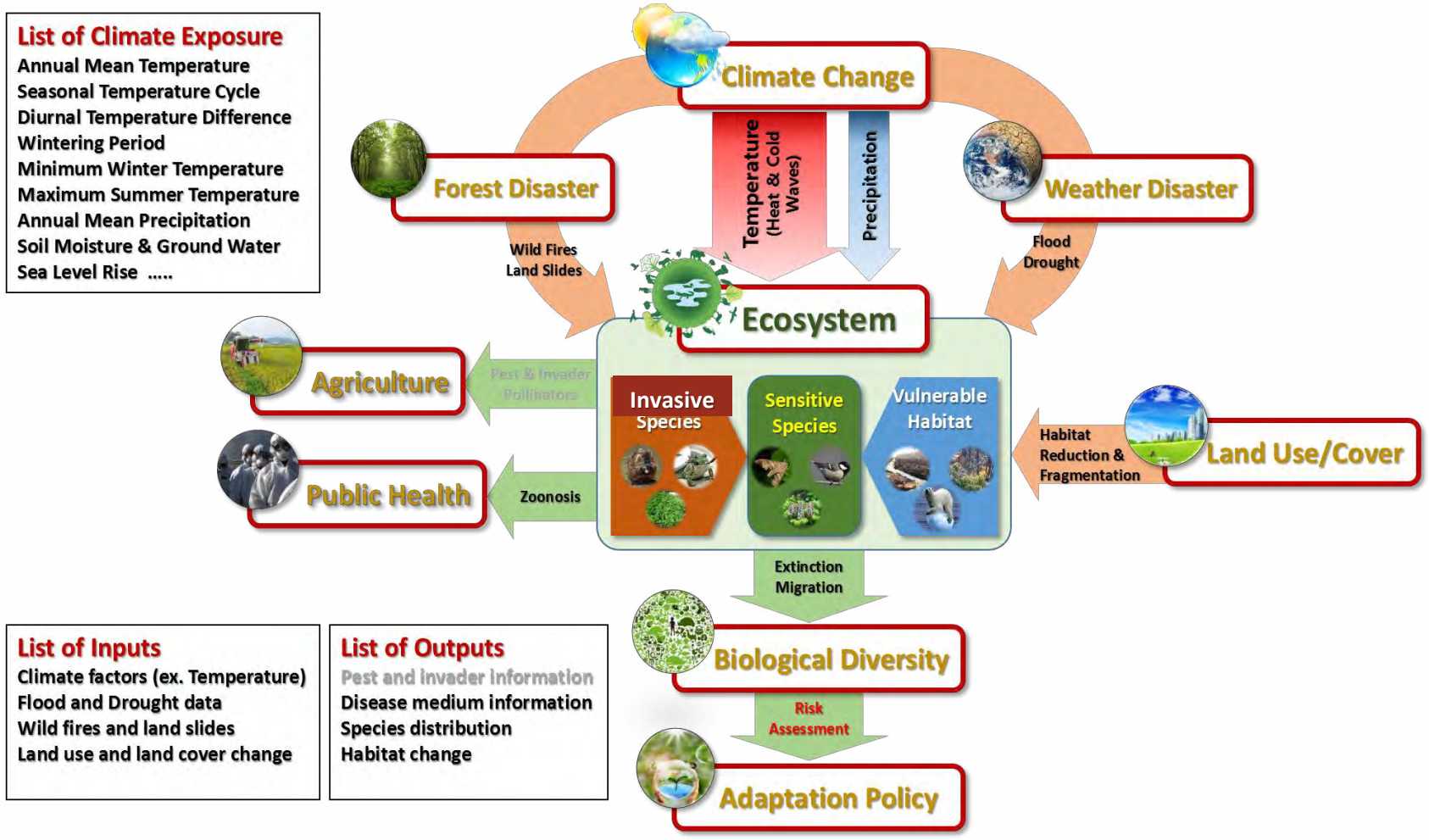
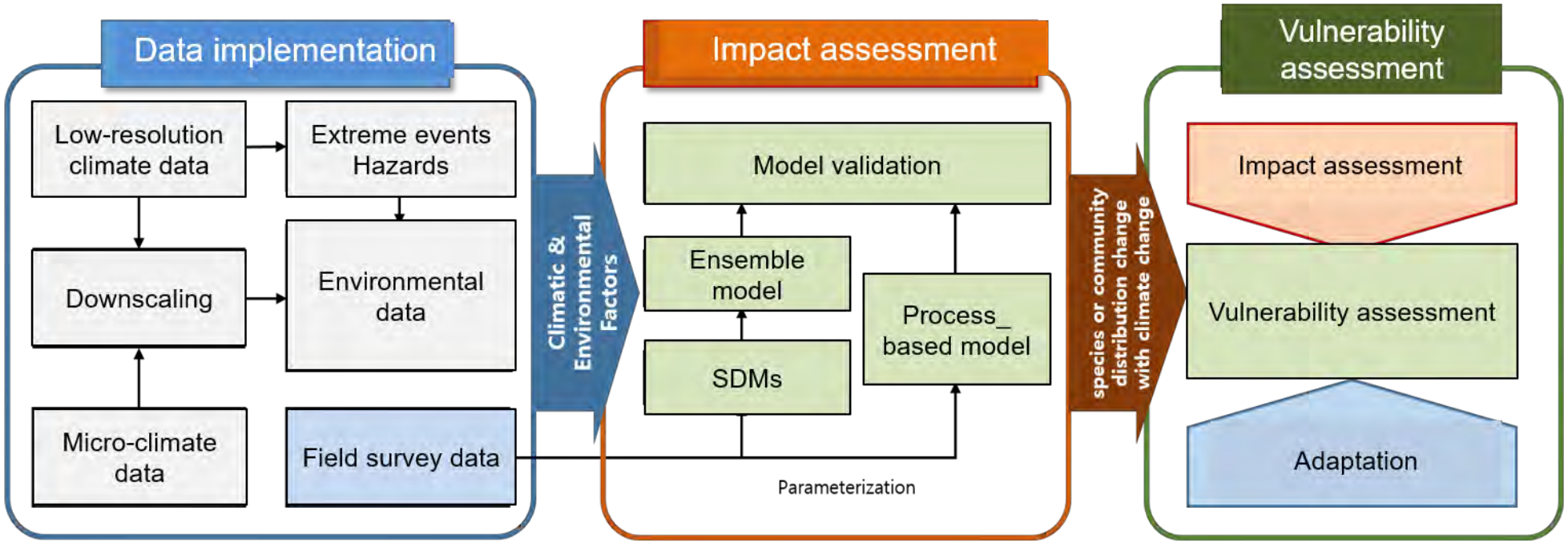
Jinzhou
North Korea
Pyongyang
Dalian
Yantai
Weifang
Qingdao
South Korea
Hiroshima
Okayama
Fukuoka
Yancheng
JIANGSU
Nanjing
Shanghai
Suzhou
Hangzhou
Ningbo

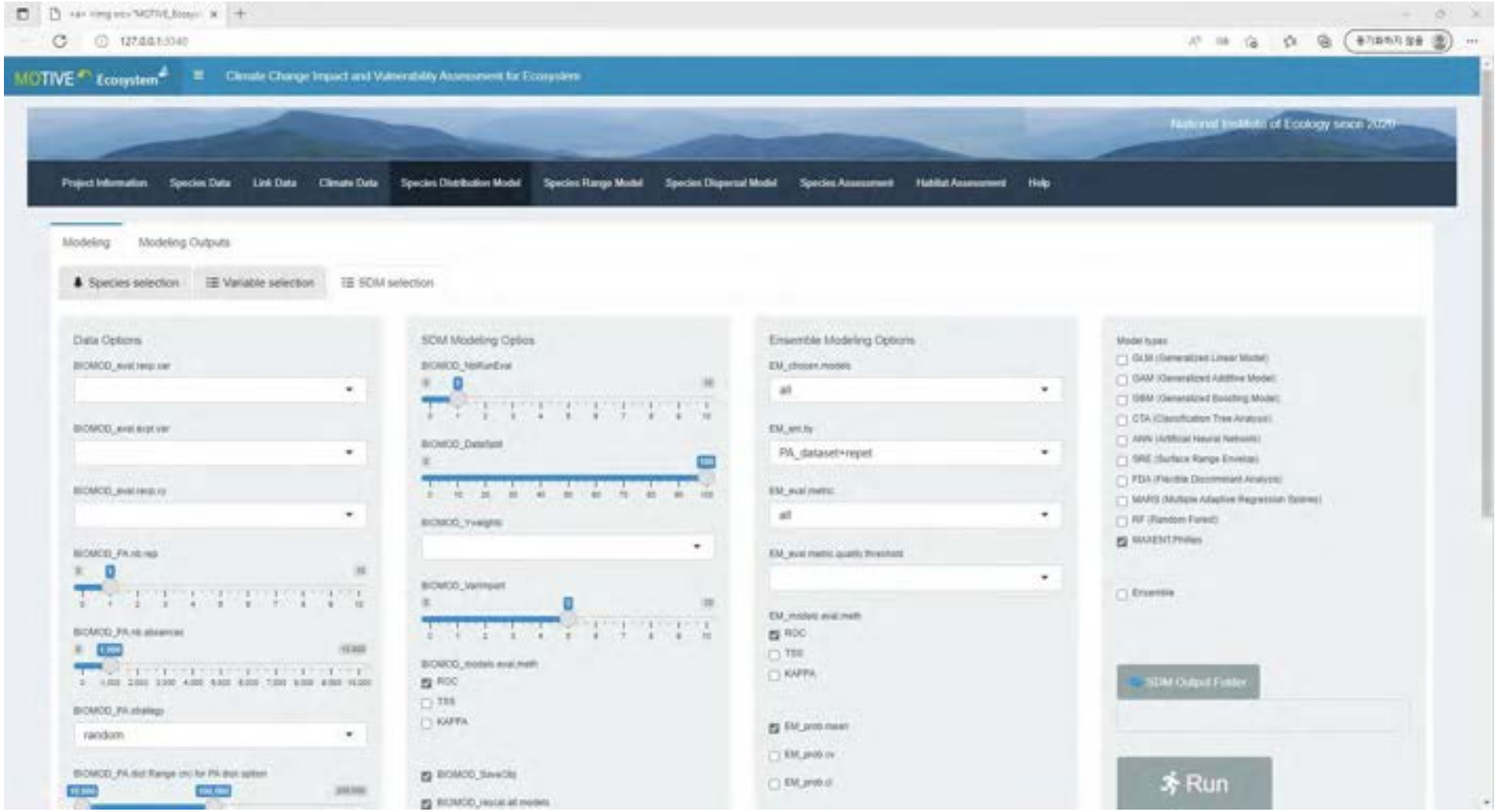
Concept of Ecosystem Model



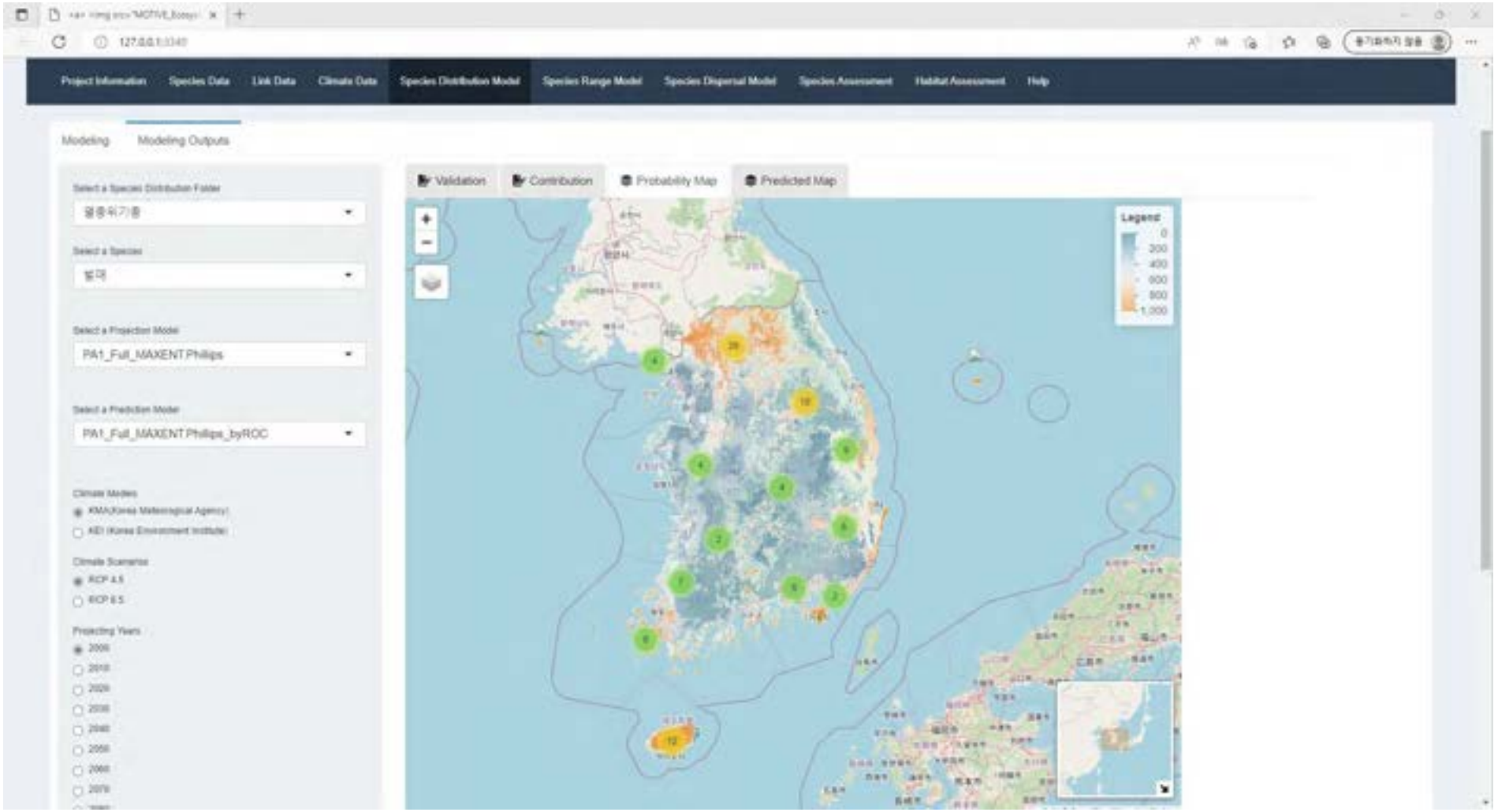
Assessment Process



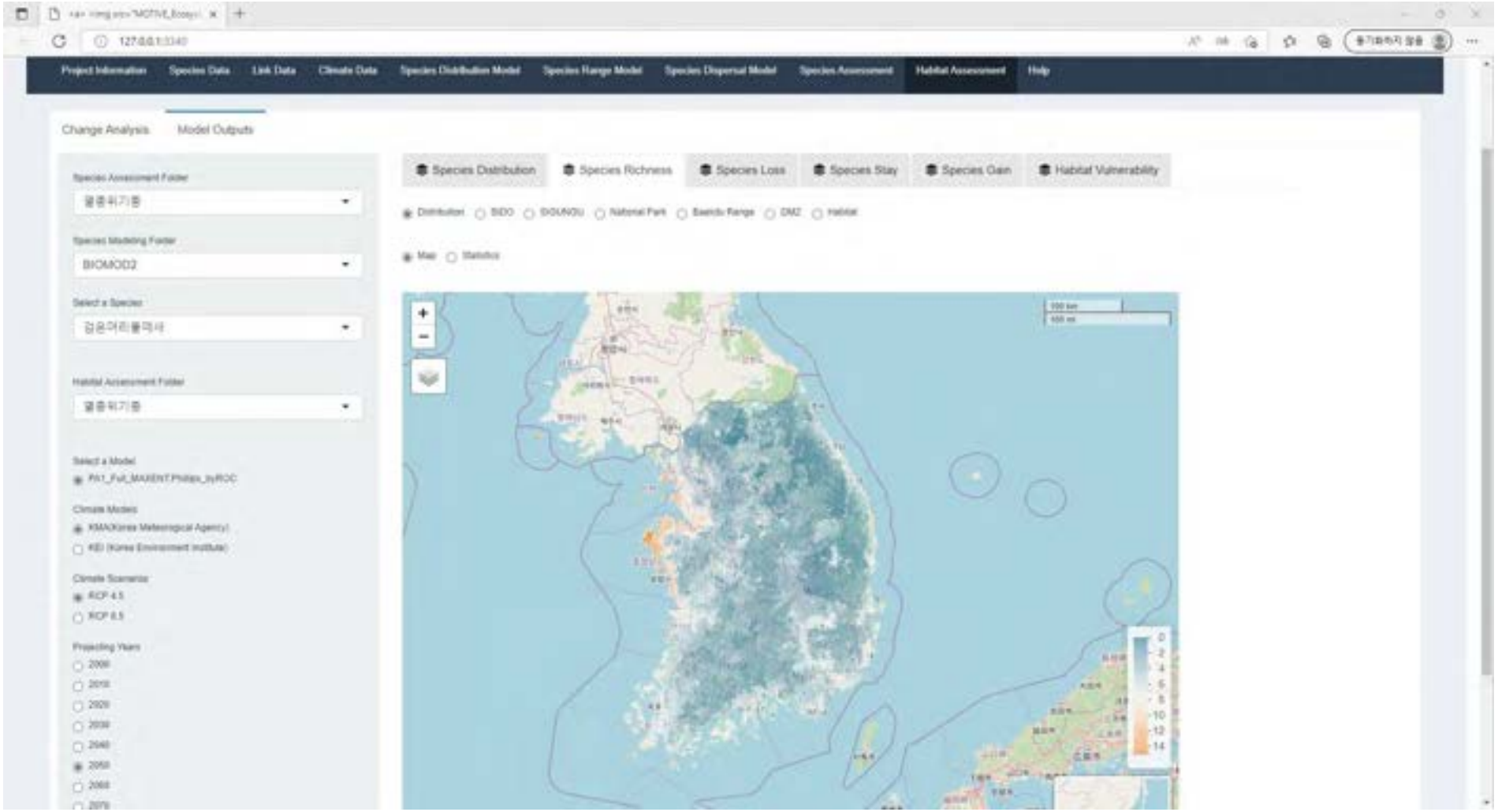
MOTIVE Ecosystem



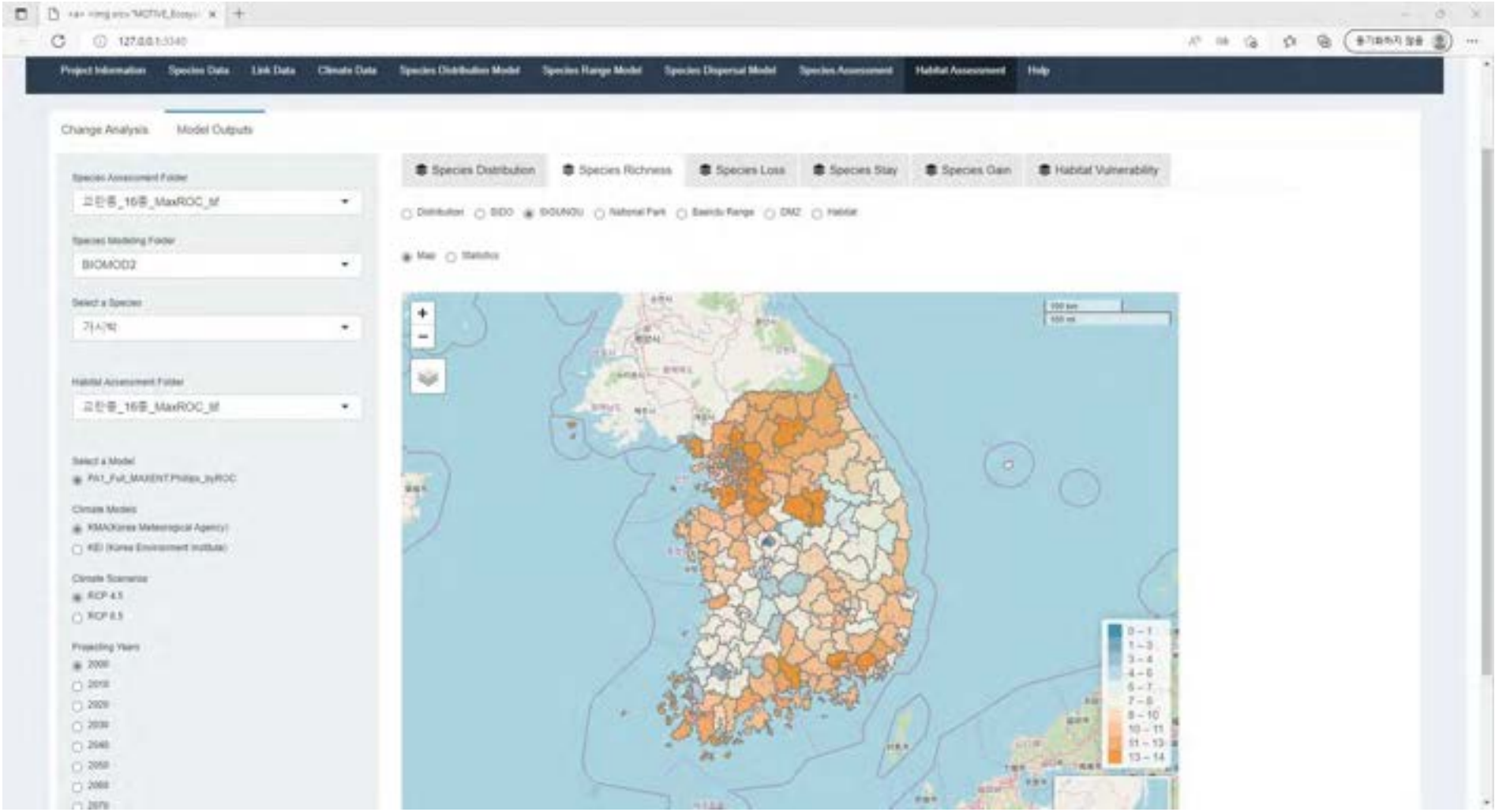
MOTIVE Ecosystem



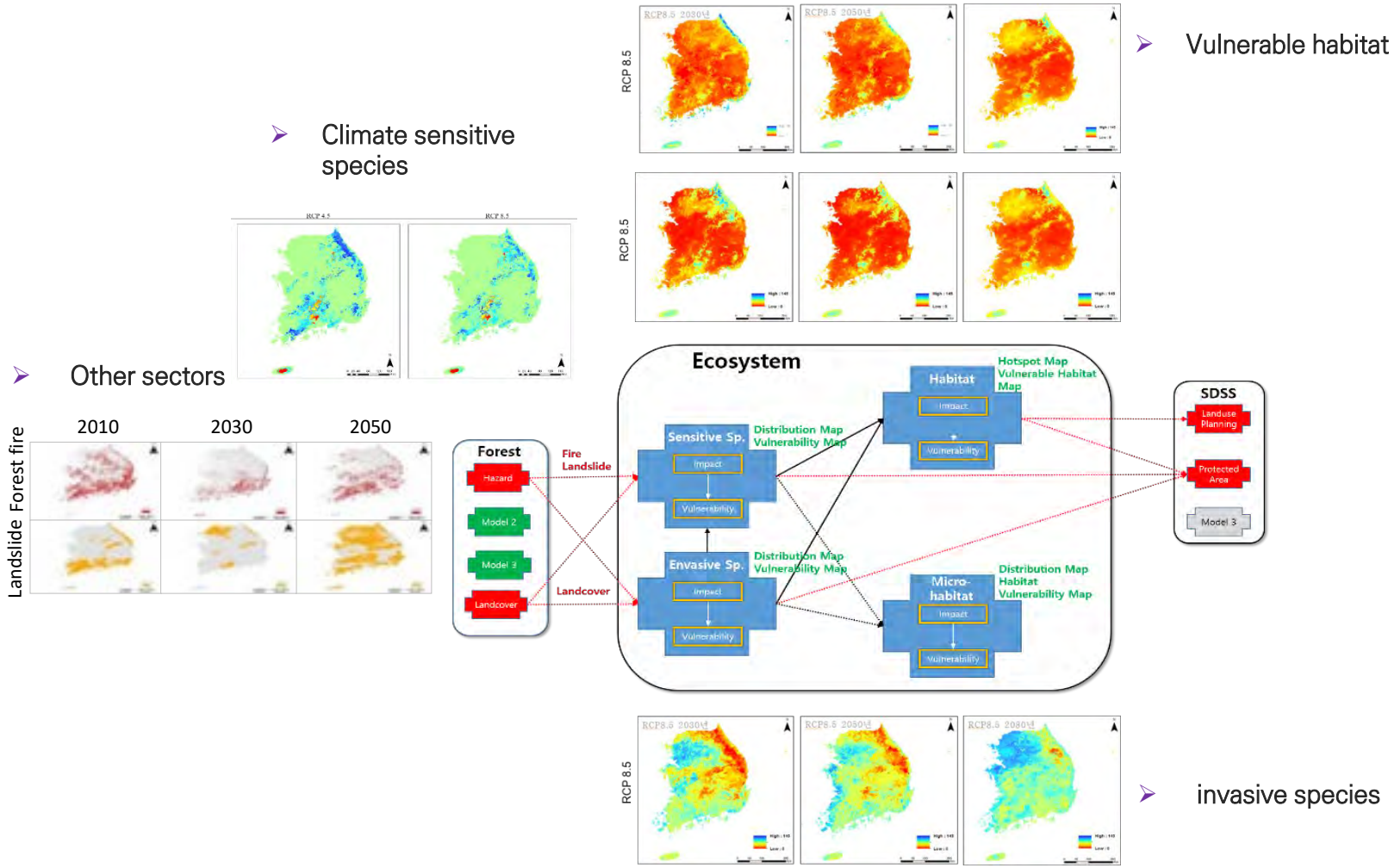
MOTIVE Ecosystem



MOTIVE Ecosystem

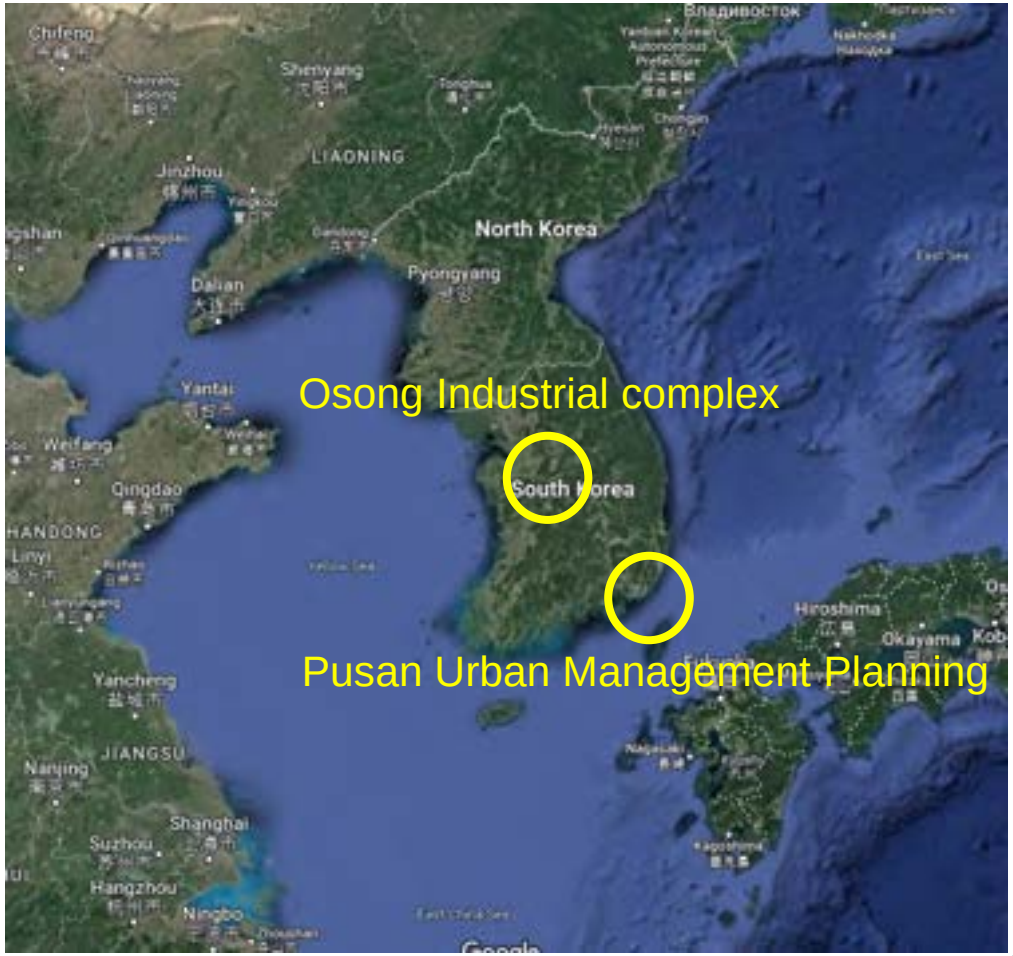


MOTIVE Ecosystem



Applications of the System

- Endangered Species
- Invasive Species
- Habitat



Osong Industrial complex

➢ Endangered Species

18 Species

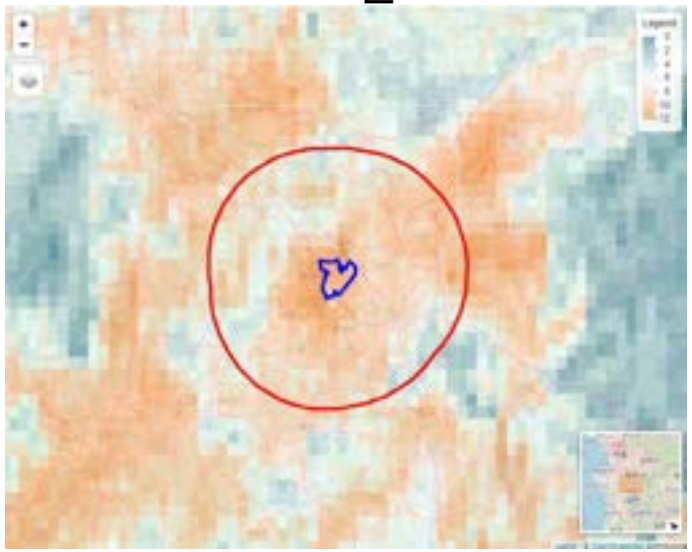
- ✓ Mammal
  - ❖ *Lutra lutra* (Linnaeus, 1758)
  - ❖ *Prionailurus bengalensis* (Kerr, 1792)
- ✓ Plant
  - ❖ *Aix galericulata* (Linnaeus, 1758)
  - ❖ *Anser fabalis* (Latham, 1787)
  - ❖ *Cygnus cygnus* (Linnaeus, 1758)
  - ❖ *Accipiter gentilis* (Linnaeus, 1758)
  - ❖ *Accipiter nisus* (Linnaeus, 1758)
  - ❖ *Accipiter soloensis* (Horsfield, 1822)
  - ❖ *Aegypius monachus* (Linnaeus, 1766)
  - ❖ *Haliaeetus albicilla* (Linnaeus, 1758)
  - ❖ *Haliaeetus pelagicus* (Pallas, 1811)
  - ❖ *Falco subbuteo* Linnaeus, 1758
  - ❖ *Falco tinnunculus interstinctus*
  - ❖ *Charadrius placidus* J.E.Gray & G.R.Gray, 1863
  - ❖ *Bubo bubo* (Linnaeus, 1758)
- ✓ Raptile.Amphibian
  - ❖ *Kaloula borealis* (Barbour, 1908)
  - ❖ *Pelophylax chosenicus* (Okada, 1931)
  - ❖ *Polyphylla laticollis manchurica* Semenov, 1900

Species Richness

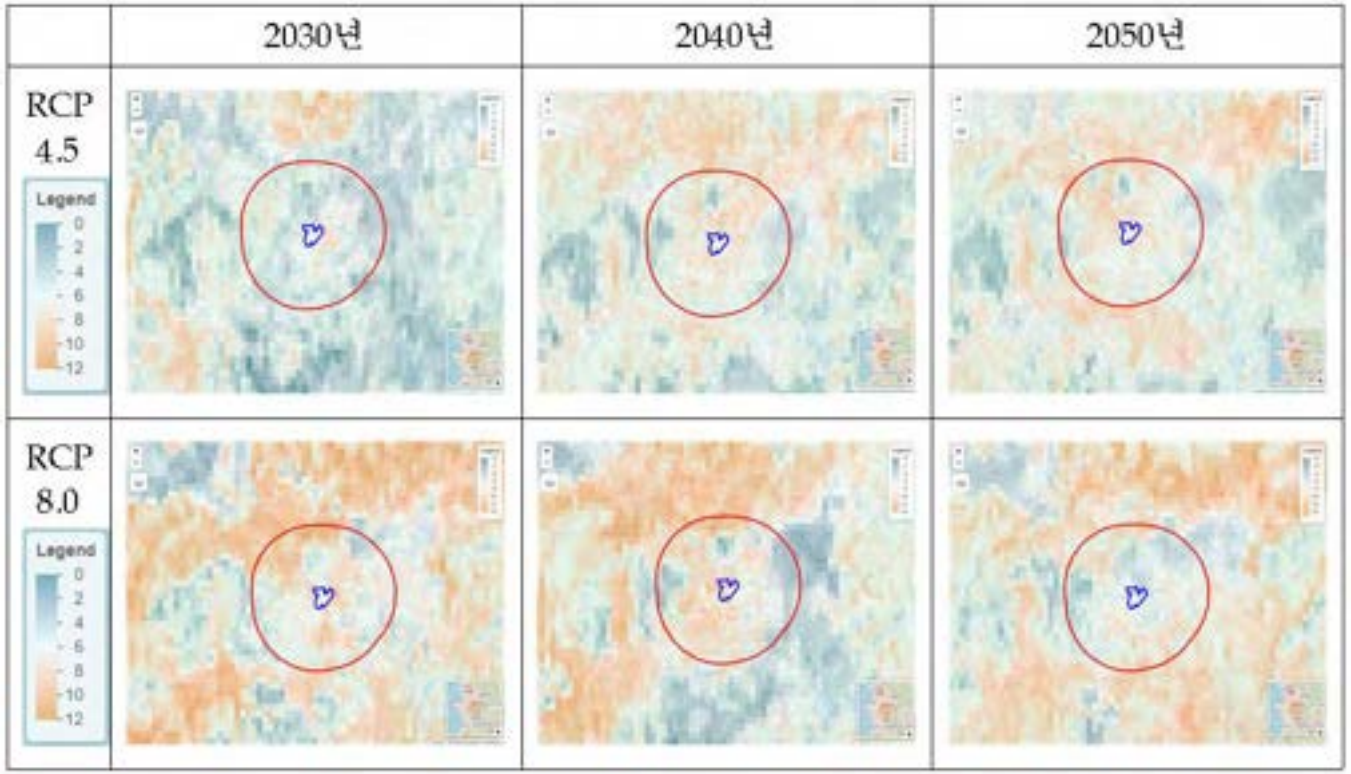
Osong Industrial complex

➢ Endangered Species

2000년



Species Richness



구 분	2000년	RCP 4.5			RCP 8.0		
		2030년	2040년	2050년	2030년	2040년	2050년
종수	12	10	11	11	12	12	11

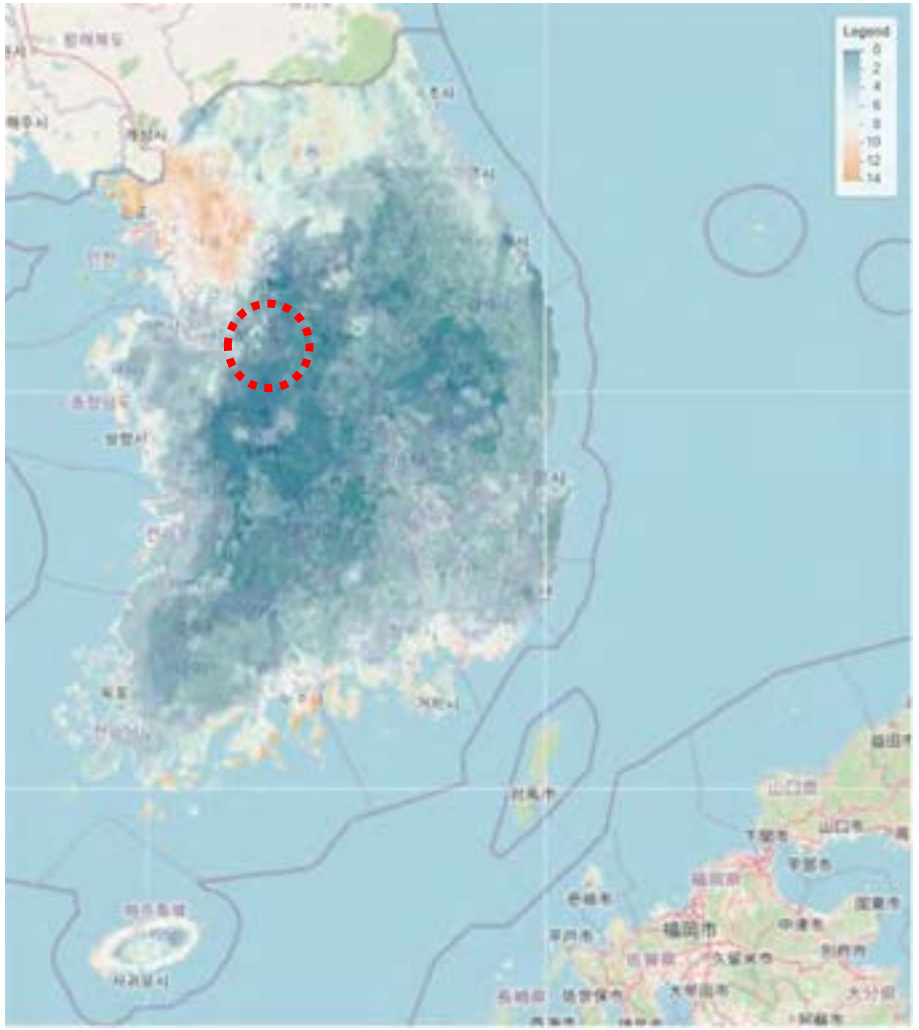
Osong Industrial complex

➢ Invasive Species

8 Species

- ✓ Plant
  - ❖ *Sicyos angulatus* L.
  - ❖ *Ambrosia trifida* L.
  - ❖ *Ambrosia artemisiifolia* L.
  - ❖ *Lactuca scariola* L.
  - ❖ *Humulus japonicus* Siebold & Zucc.
  - ❖ *Rumex acetosella* L.
- ✓ Wildlife(Fish)
  - ❖ *Lepomis macrochirus* Rafinesque, 1819
  - ❖ *Micropterus salmoides* (Lacepède, 1802)

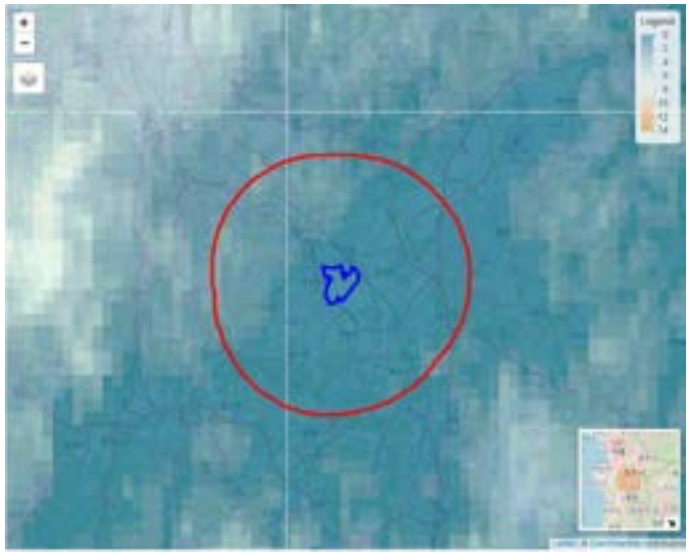
Species Richness



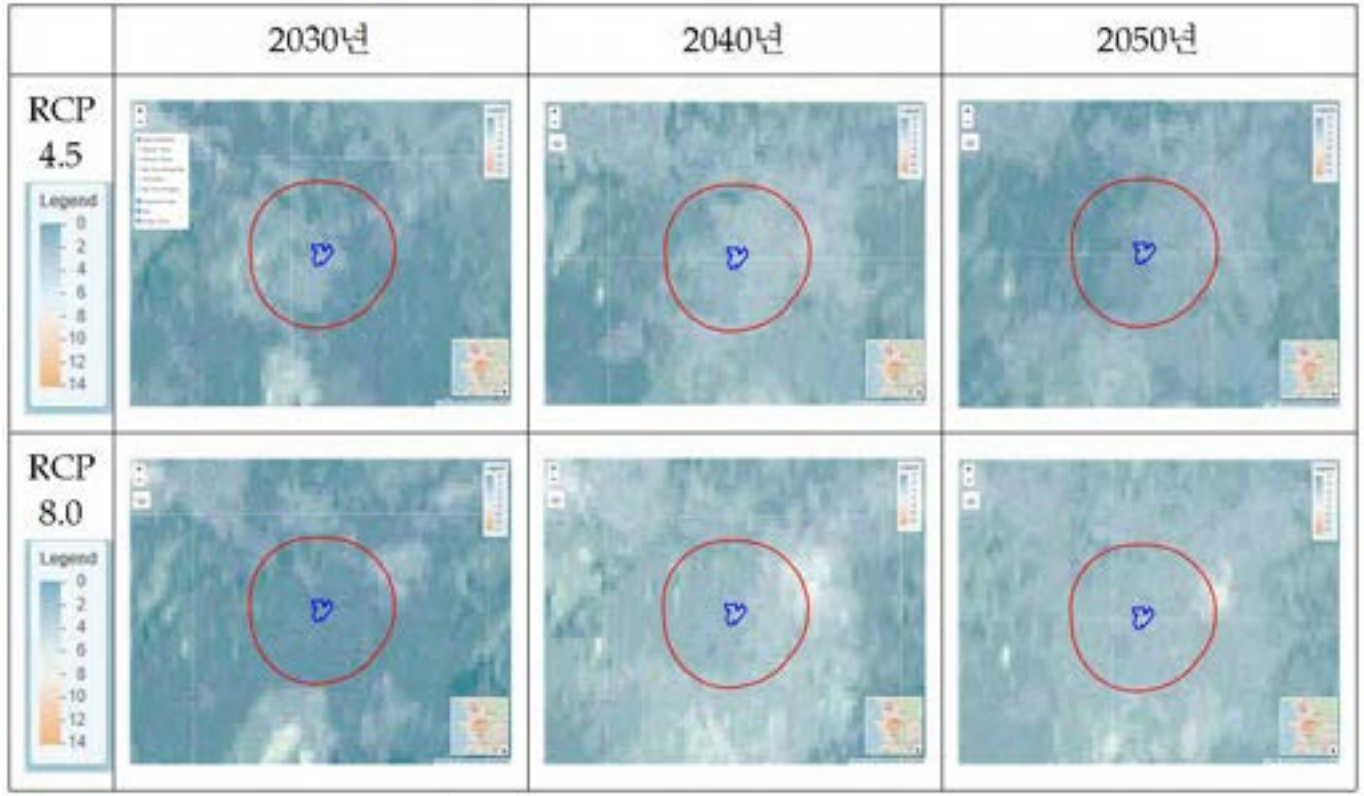
Osong Industrial complex

➢ Invasive Species

2000년



Species Richness

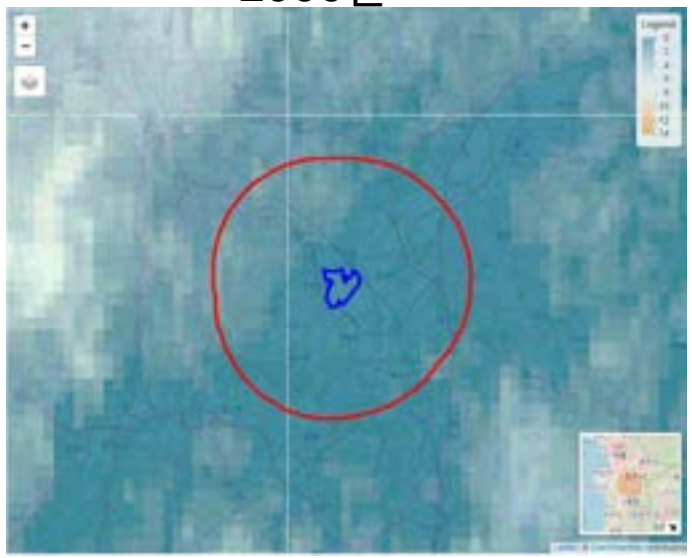


구 분	2000년	RCP 4.5			RCP 8.0		
		2030년	2040년	2050년	2030년	2040년	2050년
종수	6	7	8	7	7	8	8

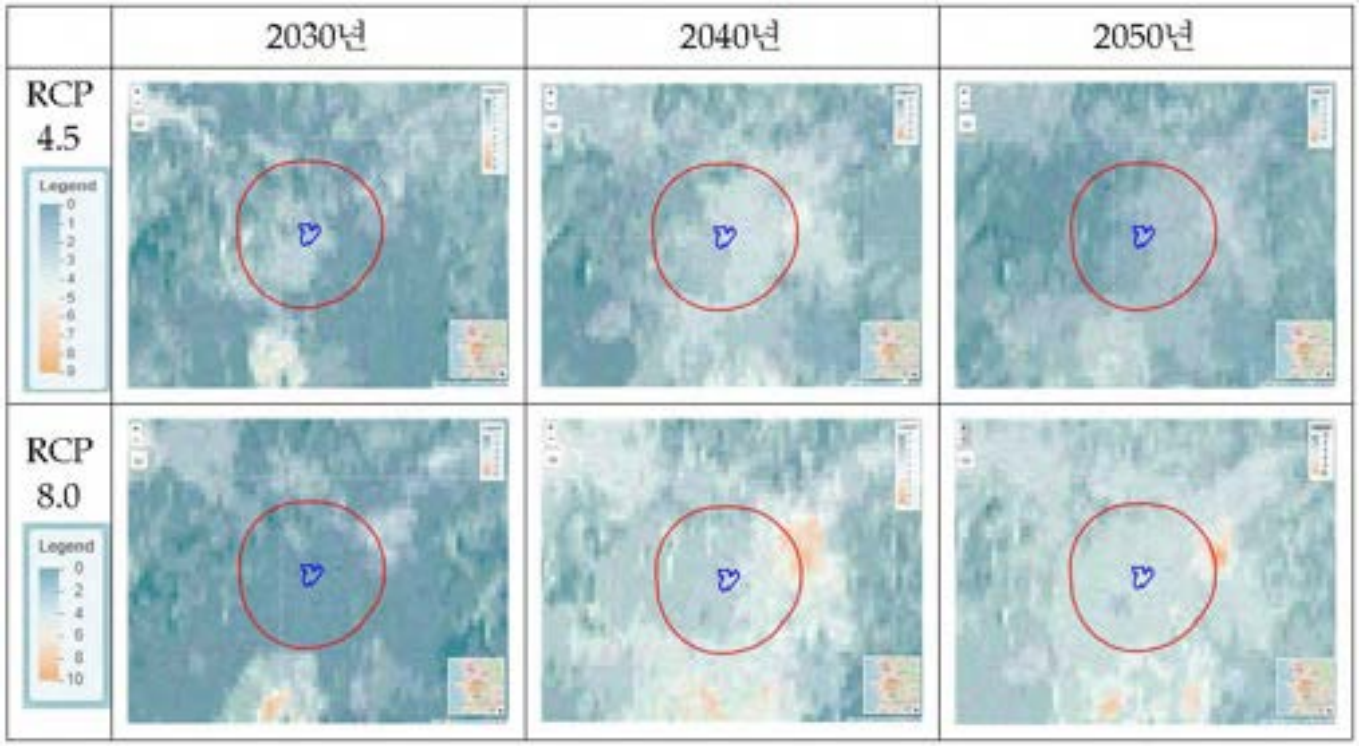
Osong Industrial complex

➢ Invasive Species

2000년



Species Reintroduction



구 분	2000년	RCP 4.5			RCP 8.0		
		2030년	2040년	2050년	2030년	2040년	2050년
종수	-	5	6	6	4	6	6

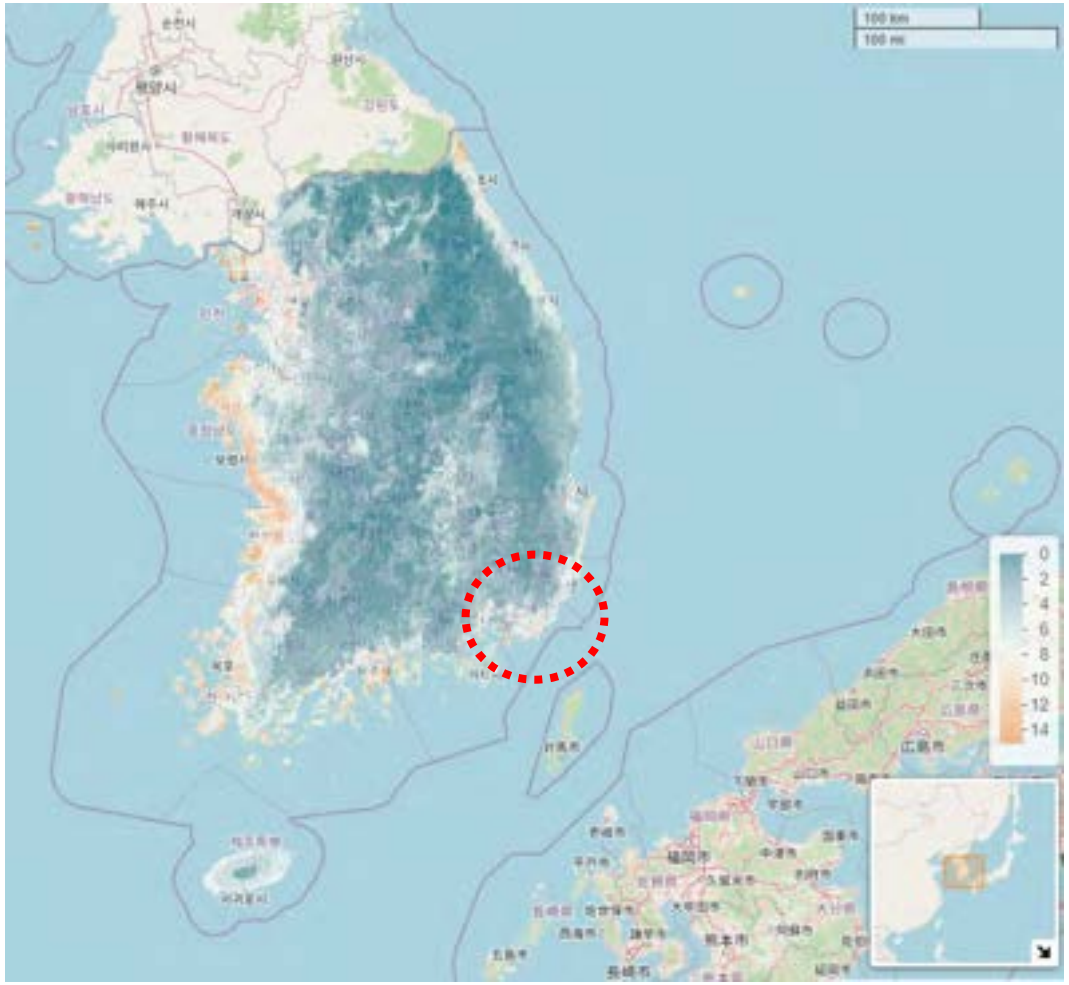
Pusan Urban Management Planning

➢ Endangered Species

18 Species

- ✓ **Mammal**
  - ❖ *Prionailurus bengalensis* (Kerr, 1792)
- ✓ **Bird**
  - ❖ *Terpsiphone atrocaudata* (Eyton, 1839)
  - ❖ *Falco subbuteo* Linnaeus, 1758
  - ❖ *Milvus migrans* (Boddaert, 1783)
  - ❖ *Accipiter soloensis* (Horsfield, 1822)
  - ❖ *Falco peregrinus* Tunstall, 1771
  - ❖ *Accipiter nisus* (Linnaeus, 1758)
  - ❖ *Platalea minor* Temminck & Schlegel, 1849
  - ❖ *Cygnus cygnus* (Linnaeus, 1758)
  - ❖ *Anser fabalis* (Latham, 1787)
  - ❖ *Pandion haliaetus* (Linnaeus, 1758)
  - ❖ *Haematopus ostralegus* Linnaeus, 1758
  - ❖ *Platalea leucorodia leucorodia*
  - ❖ *Numenius madagascariensis* (Linnaeus, 1766)
  - ❖ *Pernis ptilorhynchus* (Temminck, 1821)
- ✓ Raptile/Amphibian
  - ❖ Hynobius yangi
  - ❖ *Kaloula borealis* (Barbour, 1908)
  - ❖ *Eremias argus* (Peters, 1869)

Species Richness



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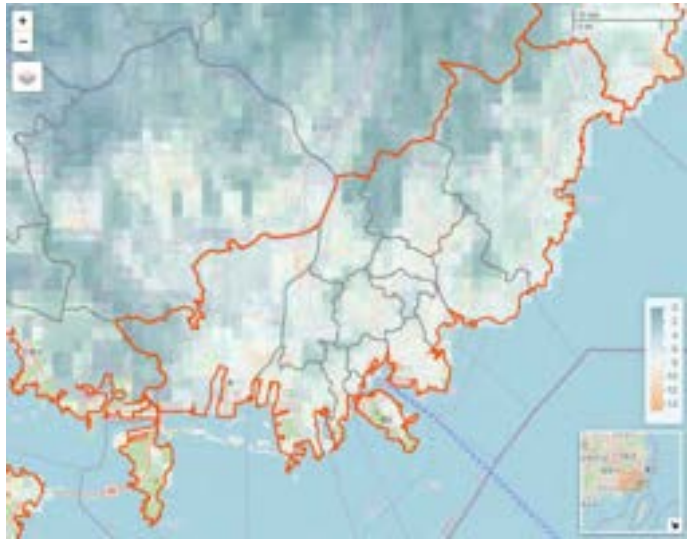
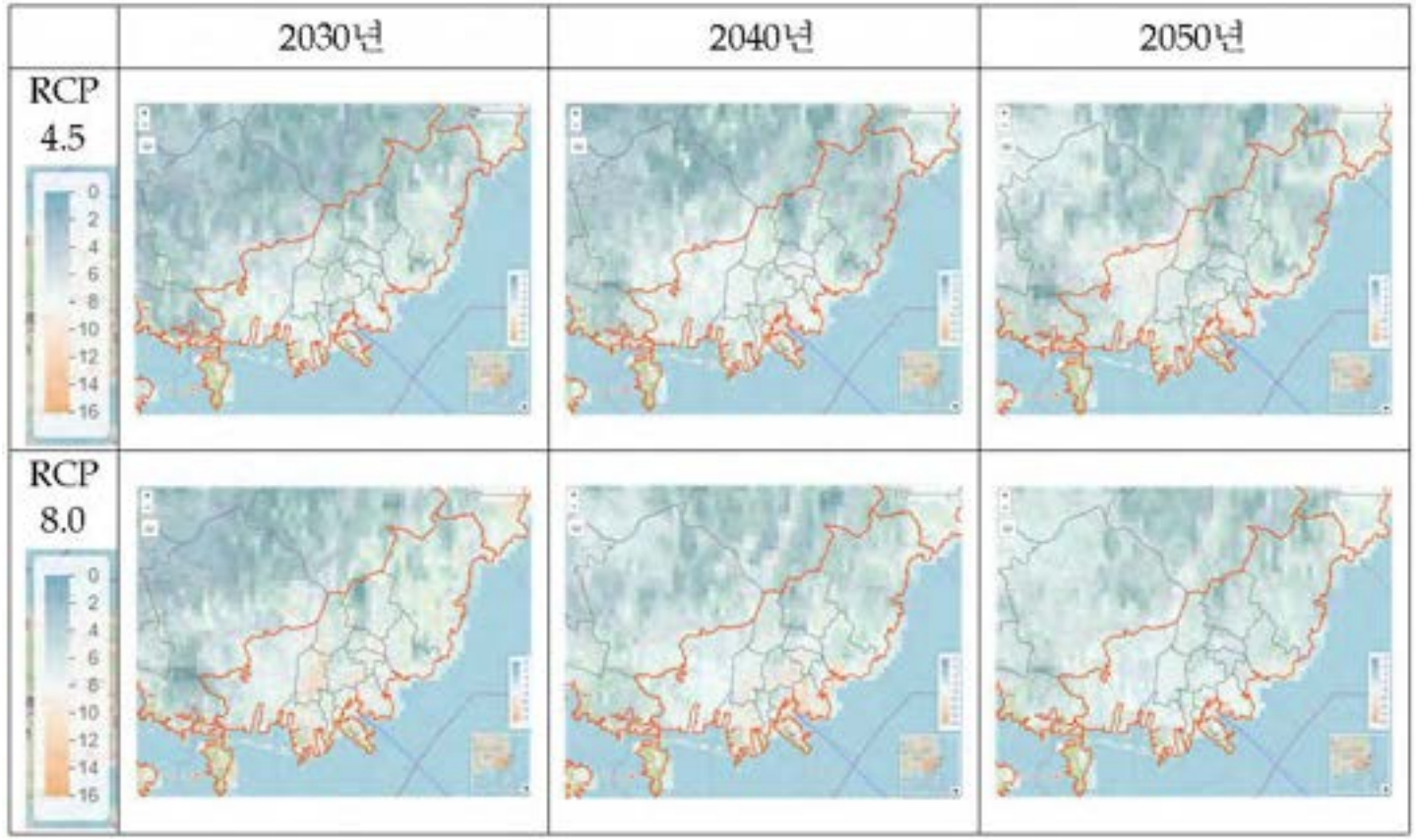
➢ Endangered Species

2000년



Species Richness



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➢ Endangered Species

Species Richness

구 분	2000년	RCP 4.5			RCP 8.0		
		2030년	2040년	2050년	2030년	2040년	2050년
부산시	16	16	16	15	15	16	16
강서구	12	15	14	14	13	14	14
금정구	12	11	12	12	12	12	13
기장군	14	12	12	12	11	13	12
남구	9	10	9	8	12	11	8
동구	9	11	10	9	10	10	9
동래구	11	11	11	11	11	11	11
부산진구	10	11	11	12	12	13	11
북구	11	12	11	11	12	13	11
사상구	11	12	9	9	11	11	9
사하구	11	10	9	10	11	11	9
서구	11	11	11	11	12	12	10
수영구	11	10	10	9	10	11	9
연제구	10	11	10	8	11	10	9
영도구	9	8	9	8	10	11	9
중구	7	8	9	8	9	9	8
해운대구	12	11	11	11	11	13	12

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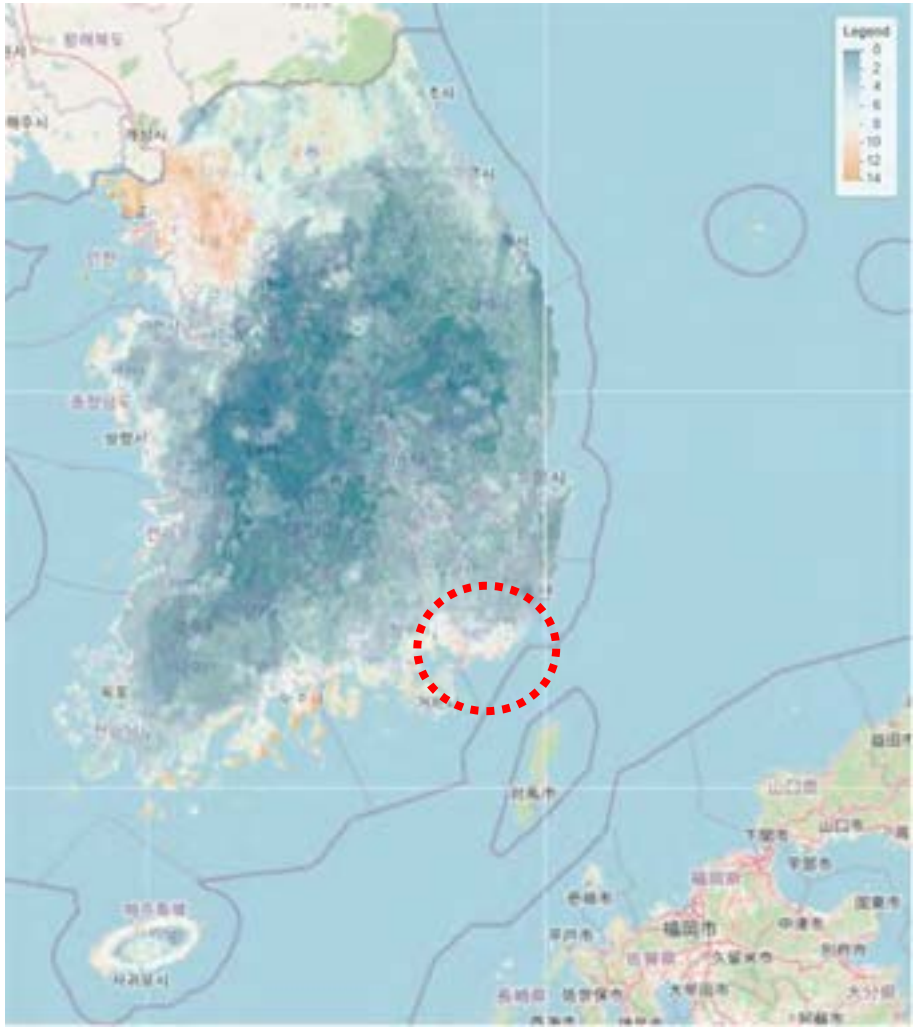
➢ Invasive Species

16 Species

- ✓ Plant
  - ❖ *Sicyos angulatus* L.
  - ❖ *Lactuca scariola* L.
  - ❖ *Ambrosia trifida* L.
  - ❖ *Solanum carolinense* L.
  - ❖ *Ambrosia artemisiifolia* L.
  - ❖ *Paspalum distichum* L.
  - ❖ *Aster pilosus* Willd.
  - ❖ *Hypochaeris radicata* L.
  - ❖ *Ageratina altissima* (L.) R. M. King & H. Rob.
  - ❖ *Rumex acetosella* L.
  - ❖ *Solidago altissima* L.
  - ❖ *Paspalum distichum* var. *indutum* Shinners
- ✓ Wildlife
  - ❖ *Lycorma delicatula* (White, 1845)
  - ❖ *Myocastor coypus* (Molina), 1782
  - ❖ *Trachemys scripta* (Schoepff, 1792)
  - ❖ *Lithobates catesbeianus* (Shaw, 1802)

Species Richness



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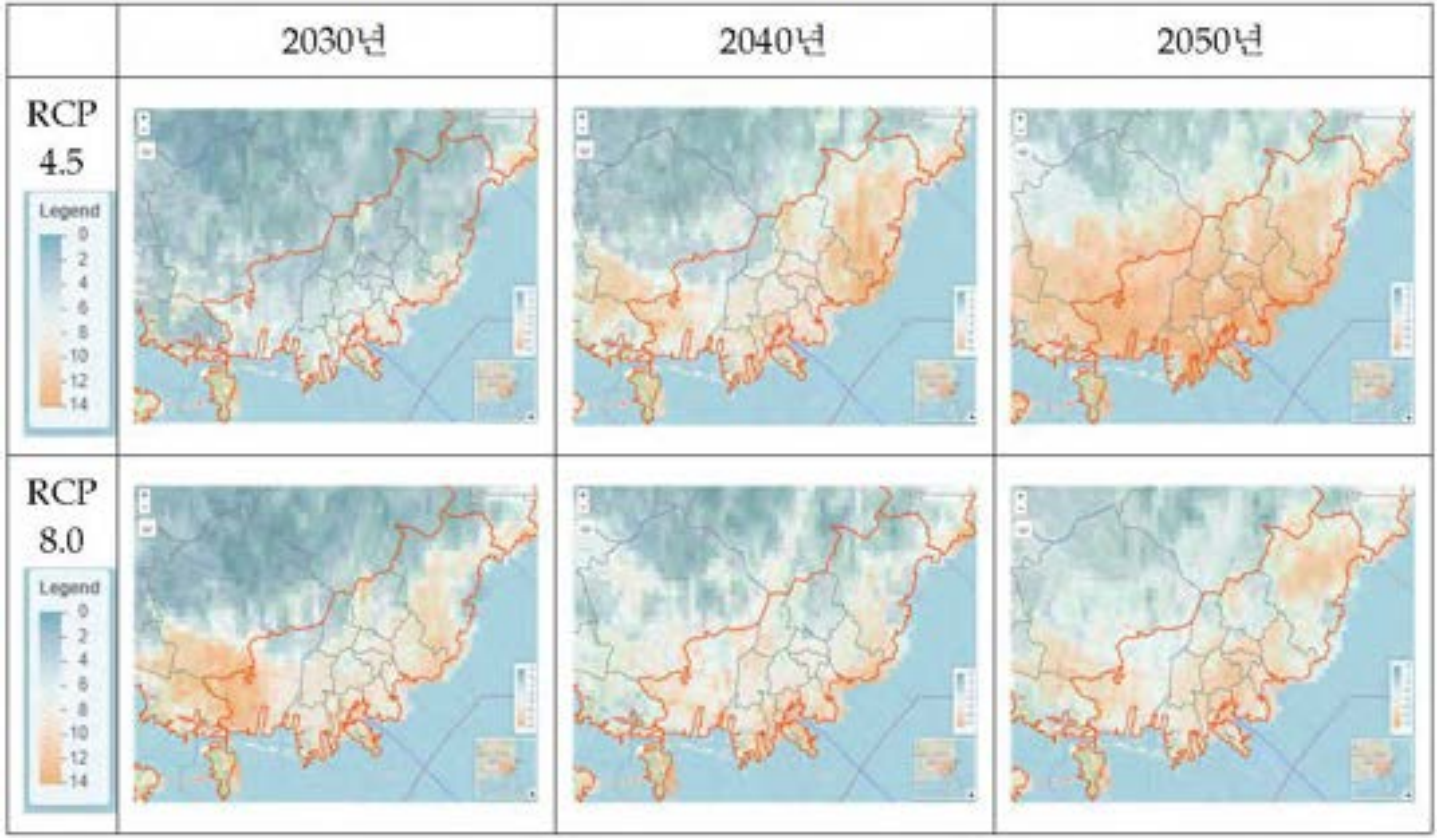
➢ Invasive Species

2000년

Species Richness



Pusan Urban Management Planning

➢ Invasive Species

Species Richness

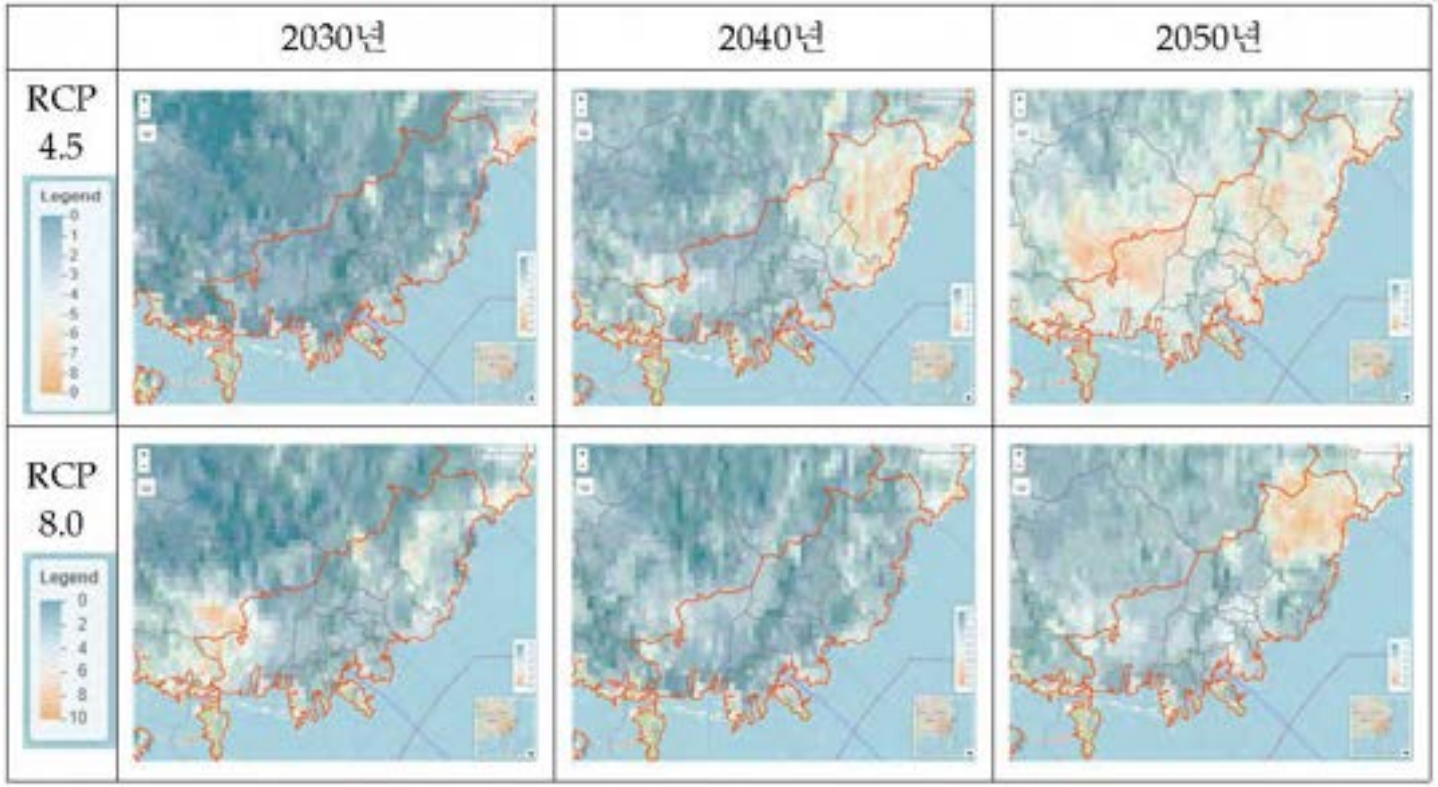
구 분	2000년	RCP 4.5			RCP 8.0		
		2030년	2040년	2050년	2030년	2040년	2050년
부산시	10	12	14	14	14	12	14
강서구	9	11	13	14	14	12	14
금정구	10	11	12	13	12	10	12
기장군	8	11	13	13	12	10	13
남구	8	9	10	13	10	9	12
동구	8	9	10	14	9	10	11
동래구	8	10	12	13	10	10	12
부산진구	8	9	10	14	10	9	12
북구	9	9	10	13	10	11	12
사상구	8	8	9	12	9	9	10
사하구	8	10	10	13	10	11	11
서구	9	10	11	14	11	11	13
수영구	8	9	10	13	9	9	11
연제구	8	8	10	13	9	8	11
영도구	8	10	10	12	11	10	9
중구	7	7	10	13	9	9	10
해운대구	9	11	13	14	13	11	13

Pusan Urban Management Planning

➢ Invasive Species

2000년

Species Reintroduction



Pusan Urban Management Planning

➢ Invasive Species

Species Reintroduction

구 분	2000년	RCP 4.5			RCP 8.0		
		2030년	2040년	2050년	2030년	2040년	2050년
부산시	-	9	12	12	12	11	13
강서구	-	6	8	10	10	8	10
금정구	-	7	9	10	8	7	10
기장군	-	8	12	12	10	9	12
남구	-	4	5	7	5	4	6
동구	-	4	5	8	4	5	5
동래구	-	5	6	8	5	5	7
부산진구	-	4	5	7	5	4	6
북구	-	4	5	8	5	6	6
사상구	-	3	4	7	4	3	4
사하구	-	5	5	6	5	5	4
서구	-	3	4	6	4	4	5
수영구	-	4	5	8	4	4	6
연제구	-	3	5	8	4	3	6
영도구	-	3	3	4	4	3	2
중구	-	1	3	6	3	3	3
해운대구	-	7	9	10	9	7	9

Pusan Urban Management Planning

➢ Habitat

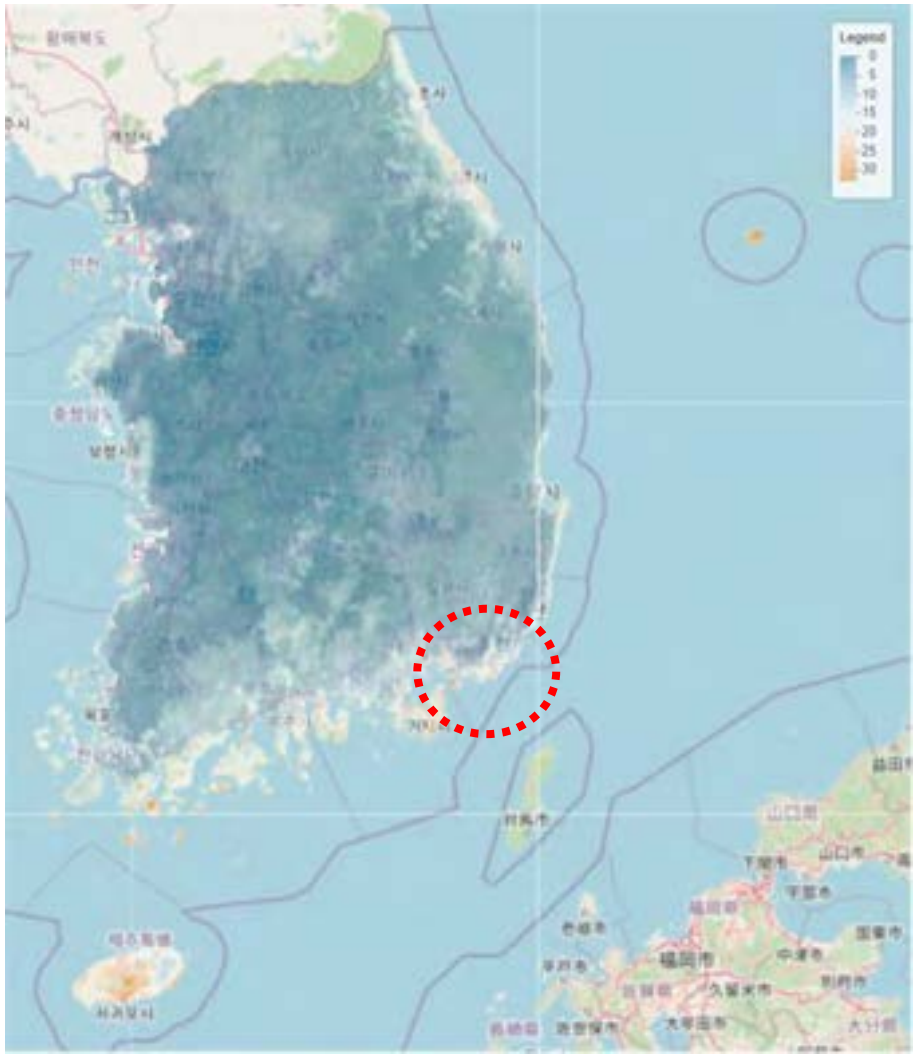
「National Climate Change Indicator Species 100」 44 species

- ✓ Plant
  - ❖ *Abies koreana* E. H. Wilson
  - ❖ *Daphniphyllum macropodum* Miq.
  - ❖ *Litsea japonica* (Thunb.) Juss.

  etc. 30 species
- ✓ Insect
  - ❖ *Camponotus kiusiuensis* Santschi, 1937
  - ❖ *Sympetrum pedemontanum elatum* (Selys, 1872)
  - ❖ *Eurema mandarina* (de l'Orza, 1869)

  etc. 12 species
- ✓ Raptile/Amphibian
  - ❖ *Kaloula borealis* (Barbour, 1908)
  - ❖ Rana temporaria dybowskii

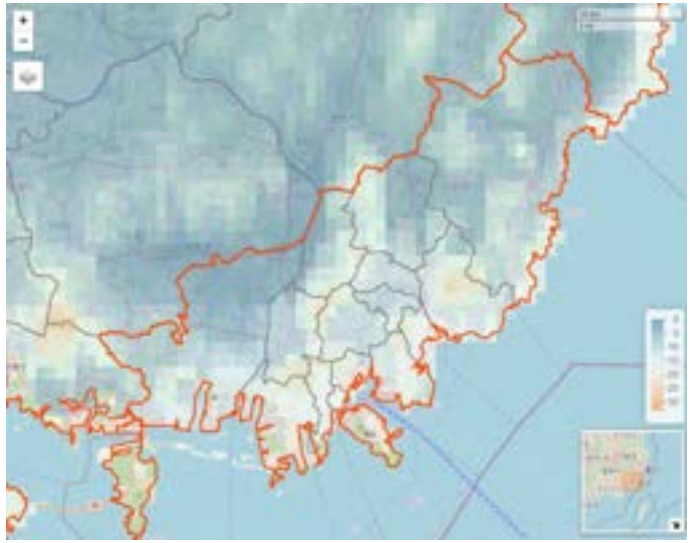
Species Richness



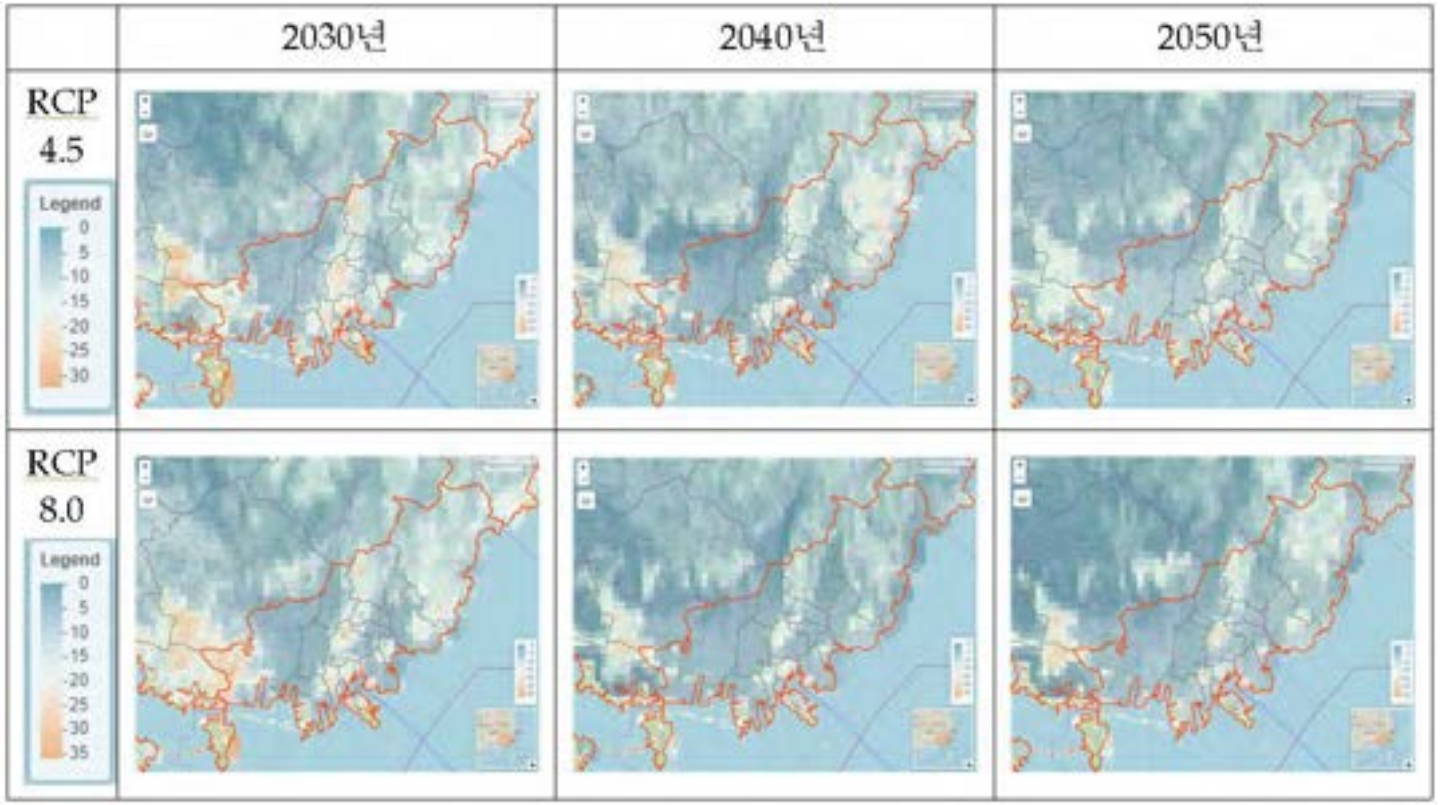
Pusan Urban Management Planning

➢ Habitat

2000년



Species Richness



Pusan Urban Management Planning

- Habitat

Species Richness

구 분	2000년	RCP 4.5			RCP 8.0		
		2030년	2040년	2050년	2030년	2040년	2050년
부산시	27	40	37	31	39	38	36
강서구	25	37	37	28	38	33	31
금정구	22	32	27	25	30	34	25
기장군	23	30	26	26	30	27	28
남구	20	22	20	20	21	17	13
동구	20	24	24	22	25	23	20
동래구	21	27	27	23	25	29	23
부산진구	21	28	27	25	30	23	30
북구	21	25	24	24	25	22	20
사상구	21	22	14	17	19	13	11
사하구	21	24	20	19	22	17	14
서구	22	29	27	20	27	21	23
수영구	21	22	20	21	23	19	16
연제구	19	20	19	21	19	17	17
영도구	20	30	24	16	30	13	12
중구	17	17	11	14	12	11	11
해운대구	23	28	24	23	27	25	24

Conclusion

- The results showed that species distribution was changed according to climate change scenarios. Therefore, we can make appropriate adaptation policies to conserve vulnerable species and habitats. We want to suggest **the MOTIVE system as a tool for EIA agencies**.

Let’s continue the conversation!

Post questions and comments in the IAIA23 app.

IAIA23 KUCHING MALAYSIA

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