Developing a Spatial Climate Adaptation Framework with a Citizen Participatory Approach

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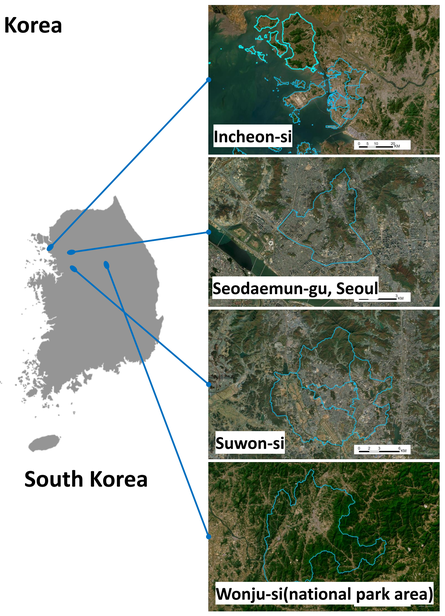
Study sites

Climate change adaptation system in Korea

- Under the Carbon Neutrality Act, South Korea requires local governments to create climate adaptation plans every five years(226 in total). Started in 2020, many local governments are now working on their second adaptation plans.
- Sectors of plan: health, ecosystems, water management, land and coastal areas, industry and energy, agriculture and fisheries
- To assist local governments' planning, the national government has developed assessment tools : MOTIVE (impacts) and VESTAP (vulnerabilities). VESTAP assesses relative vulnerabilities at the neighborhood unit(dong) for each sector-specific evaluation item.
- Recently, many regions have been experiencing increasing damage due to higher temperatures and increased rainfall.



Introduction

- The rapid climate change is expected to exceed capacity soon, but its impact tends to vary by region and the resulting damages also differ depending on the social context. Therefore, it is essential to assess and respond to climate change impacts and conditions at the local level. Furthermore, spatial planning becomes increasingly important in determining how and where to allocate specific options.
- "Living lab" can be described as the development of solutions through user-oriented open innovation, involving testing and assessment("labs") in real-life contexts("living"). In this project, unlike past top-down planning and tool development approaches, we aim to address climate change adaptation issues through a bottom-up approach.
- The objectives of this research project are to support local governments in developing adaptation plans through a living lab approach (spatial planning) and to develop and validate usability of decision-support tools so that it can be practically used throughout the planning process(development of tools).

Methods

- literature review on adaptation frameworks, decision support tools, and living labs case studies
- To examine South Korea's climate change adaptation system, urban planning, and environmental planning guidelines
- To draft a framework specific to Korean local governments and then gather feedback from experts
- Through newspaper articles, local reports, and interviews with local decision-makers, we identified issues that require resolution through spatial planning for each regions

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Results

Spatial adaptation framework

Phase	Tasks	Key Questions	Types of living labs and activities	Key participants
Challenges Identification	▪ Identifying sectors requiring response as priorities and local issues that need attention ▪ Building consensus on the need for adaptation ▪ Identifying the region's key assets/values	▪ What sector requires urgent adaptation in our region? Have past events caused significant damage, and do we anticipate similar/new impacts in the future? ▪ Should we invest in adaptation, or accept some damages? ▪ What are the critical facilities/services in our region?	Co-commi-ssioning / Co-analysis	▪ local community ▪ stakeholders ▪ Experts ▪ Planners ▪ public administrator
Risks Assessment and Prioritization	▪ Selecting specific risk to assess in each sector ▪ Understanding risk assessment methods ▪ Data collection for risk assessment (if necessary) ▪ Assessing risks and determining priorities, including vulnerable areas and populations	▪ Which risks in our region require special attention? ▪ What data and methodologies can be used to assess this risk? ▪ If existing data are inadequate, what data should be collected? ▪ Where do damages exceed local capacity? Where do the most vulnerable groups/facilities/services exist? Where is the most urgent response needed?		
Planning	▪ Identifying adaptation options available ▪ Considering the adaptive pathways and spatial planning alternatives ▪ Decision on plan with alternative comparisons ▪ Implementing the plan	▪ What adaptation technologies/policies are available for us? ▪ What are the goals of adaptation? Considering future climate change, which technologies/policies should be applied where at each time? ▪ Considering our conditions, what is the most optimal and feasible plan? ▪ How to implement the plan, and who will carry it out?	Co-design	▪ stakeholders ▪ Experts ▪ Planners ▪ public administrator
			Co-delivery	▪ local community ▪ stakeholders ▪ public administrator
Monitoring and evaluation	▪ Collecting data for plan evaluation indicators ▪ Assessing thresholds in the adaptive pathway and making decisions on its continuity ▪ Evaluating planned outcomes, ancillary benefits, and seeking improvements	▪ Have the applied adaptation technologies/policies been sufficiently effective? ▪ Is the currently applied technology/policy sufficient, or are additional measures needed? ▪ Are the adaptation goals being achieved? Have there been any additional benefits? What areas require improvement?	Co-assess-ment	▪ local community ▪ stakeholders ▪ public administrator

regional issues needing sector-specific spatial plans

Sector	Regional issues	Required information
Ecosystem	managing private land within national parks and wildland-urban interface developments	• Changes of disaster risks in forest area (damage area/cost, etc.) due to land use changes • Setting conservation priorities based on multi-objective optimization • wildfire and landslide risks • Projection of biodiversity/habitat density with climate and development scenarios • management strategies considering species that trigger pollen allergies and the potential damage scale
	landslides and wildfires risks	
	management of endangered species and biodiversity	
	increasing pollen damage	

Sector	Regional issues	Required information
Water-management	Floodings(streams, urban)	• future water demand and drought projections • urban green space planning strategies considering future drought • identification of flood-prone areas and damage prediction, response priorities • comparisons among flood risk reduction measures • urban heat exposure and risks, mitigation strategies • benefits of optimal land use considering climate change
	Drought and water stress	
Land	Increased heat exposure	
	Incentives for disaster prevention planning	

Discussion

- A bottom-up approach is not the ultimate solution in all areas. It also requires substantial time and resources. It's essential to differentiate between parts and issues of the adaptation plan where a bottom-up method is effective and where it is not.
- Decision support tools for adaptation planning should provide information in a step-by-step manner rather than following a 'one-size-fits-all' approach. With uncertainties and complexity of climate change and adaptation, generic tools can obscure the information needed by local decision-makers and make it difficult to determine when to use them.
- It is essential to involve users from the initial setup to the development of tools to make sure it can be practically used in local planning.

Next step

- As this is the first year of this project, we are planning to develop and validate decision support tools that users need in adaptation and support the establishment of adaptation plans over the next six years (2023-2028) in pilot study sites, with local community members.
- Based on the lessons learned from conducting living labs in pilot sites, we will develop guidelines and provide tools to enable participation-based adaptation in other regions, promoting its diffusion.