Developing a globally useful visioning and forecasting framework for biodiversity, people, and climate neutrality in Korea

Policy actions that could reduce emissions, increase carbon sinks across varied ecosystems, build resilience to climate change and account for trade-offs and unexpected outcomes require an accurate and credible forecasting capability to test scenarios involving land-management decisions at fine resolution but at global scales. It also requires a dynamic (non-static) modelling approach to allow for novel system behaviours and a modelling platform whose outputs are rates or quantities that are policy-relevant but also that may trade-off against each other, for example, biodiversity versus carbon sequestration versus agricultural productivity. To drive the modelling platform, we also require scenarios that span the decision space from place-based, people and nature-focused, solution-oriented, and locally driven through to top-down, multi-scale, and production-focused.

To date, most scenarios have been building on exaggerated and unsustainable human development and economic growth-oriented pathways towards the futures that, in most cases, result in biodiversity loss and ecosystem degradation with nature as a passive recipient. As a result, despite accumulating evidence from science, we do not have the capability to quantify or forecast what actions will contribute to reversing biodiversity loss, building ecosystem resilience, and ensuring human wellbeing for generations to come. In parallel, interactions between socio-economic, land use, climate and biodiversity models, despite vast advancements in the last decades, have not been pursued jointly to understand how nature and human actions can contribute to climate mitigation. This project responds to these research gaps in taking a step forward in building the capability for visioning and forecasting nature and people positive futures.

In 2023-2024, we began the scenario modelling of nature and people positive futures in Korea through two visioning workshops at the [Ecopeace Forum](#) (19-22 September 2023, 3-6 November 2024) as part of the [DMZ Open Festival](#) with an established network of collaborators across institutions in Korea and internationally. Diverse future visions and pathways were imagined for Korea employing the 2050 Living in Harmony vision of the [Convention on Biological Diversity](#) and IPBES scenario and modelling framework [Nature Futures Framework](#) with human nature relationship at its centre. The visioning used the [Seeds of Good Anthropocene](#) and [Imagination Infrastructure](#) approaches to build realizable and sustainable futures on existing good practices and local imaginative capacity. We propose continuing this work in the coming years by laying the foundations for a model-based exploration of the outcomes of these scenarios on people, nature and ecosystems.

In this project, we aim to contribute to biodiversity science and practice by applying key principles and approaches proposed by the IPBES Nature Futures Framework (NFF) in Korea.

The project has the following objectives:
- Developing nature and people positive future visions and pathways at a national scale ('**Nature Future narratives**'),
- Developing a joint modelling framework that would enable dynamic biodiversity and climate feedbacks modelling to simulate multiple pathways ('**Nature Future scenarios**').

The project is conducting the following activities:

1. **Social-ecological-economic trend analyses** of Korea's development trajectory
2. **2050 future visions of Korea** centered on nature and societal wellbeing
3. **Pathways towards 2050 visions** using nexus and transformative change lenses
4. **Land use land cover maps of 2050 visions** using the SEALS model and expert input
5. **Biodiversity-Climate-Society joint modelling framework** for scenario analyses
6. **Biodiversity-Climate-Society model simulations** with 2050 land use land cover maps for impact assessments using JULES, NCAR-CLM5, WRF, InVEST models
7. **Integrative scenario analyses** of Biodiversity-Climate-Society feedbacks modelling using national and global indicators

This project will set the foundation for future work and produce **new science and evidence to enable societal transformations in Korea as a case study of what can be achieved in other countries.** It focuses on alternative futures to identify enabling policies and societal changes that can stimulate transformation towards climate neutrality, biodiversity conservation, and human wellbeing. These are an integral part of the CBD Kunming-Montreal Global Biodiversity Framework (KMGBF), in particular Goals A and B and Targets 1-4, 7-8, and 11-13. Hence, the outcome of this project can inform the implementation of KMGBF, Climate Net Zero and National Determined Contribution (NDC) goals, enhancing the use of scenario- and model-based information in national policy planning and monitoring. This activity will build on our Korean collaboration to ensure that the modelling (land, atmosphere, biodiversity) is challenged with realistically place-based and people-focused visions that reflect diverse roles of nature. The outcome of this project will inform the global community on the potential use of global and regional models in data-poor regions and enhance global and regional models with finer-scale, empirically tested data and locally relevant parameterisation using local data and expert input. This is a mechanism considered centrally in the implementation of CBD KMGBF and relevant also for the UNFCCC's NDCs.

Further, there is an **established network of local and international governing agencies and research capabilities** to conduct this project successfully with complementary scientific and technical expertise and experiences. Internationally, this project has the potential to inform IPBES and IPCC reports as a case study and support the national implementation of CBD KMGBF (e.g. NBSAP and NR) with policies and actions that can guide the nation towards sustainable futures. Further, partner institutes' (e.g., UKCEH/UK, SRC/Sweden, Wits GCI/South Africa, WSL/Switzerland) close collaboration with national (e.g., NIE, GGD/Korea, Defra, BEIS/UK, SCNAT/Switzerland) and international (e.g., IPBES, IPCC, CBD, UNEP, UNSDG) agencies will make this project visible in relevant platforms for broader societal impact.

For More Information

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