

## ● A research partnership for improving sustainability science methodologies

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### Background

Sustainability science still lacks “methodological anchors” that can be used to bring together researchers and societal stakeholders to pursue a shared long-term vision for the sustainable management of socio-environmental systems and explore possible ways of realising this vision. Several digital technologies, based on artificial intelligence, modelling or sensor networks, being studied in connection with the Sustainable Development Goal dedicated to industry, innovation and infrastructure (SDG 9), offer attractive prospects in this respect. The PREMISS project, funded under the Belmont Forum Pathways to Sustainability call, was set up to study and assess how applicable these technologies are.

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#### Further reading

<https://www.youtube.com/watch?v=LhyhyIcH8m8>

## Imagine...

Imagine an engineer adapting a model of an irrigation system to assess the impact that adding dikes would have on the “sustainability index” of the water supply system and the communities that depend on it. Imagine residents discussing with their local council the increase in temperature in several of their neighbourhoods and negotiating the development of green spaces with the help of an interactive tablet combining individual sensor measurements, satellite data and simulation results. Imagine farmers using their local knowledge and data from sensors co-constructed with researchers to compare different types of crops and agree on the best way to optimise their income while conserving natural resources. These situations would have been difficult to imagine ten years ago. Today, although they are within our technological grasp, their use is still in its infancy. This is precisely why the PREMIS project consortium has brought together academic and non-academic partners from South Africa, France, Turkey, Vietnam and Taiwan, with the aim of fostering the co-design and use of these types of digital methods in the sustainable management of complex socio-environmental systems. The modelling, simulation and crowdsourcing methods targeted by the project allow scientists and stakeholders to explore the sustainability of different options or scenarios “before implementation” in the virtual world. Then, once a solution has been successfully implemented, they empower

stakeholders to deploy and monitor the chosen options, but also to evaluate their relevance and impacts.

## Use of digital technologies and sustainable management of socio-environmental systems

Initially, PREMIS aims to provide as comprehensive an overview as possible of how the above-mentioned digital technologies are used. Two systematic reviews will use a collaborative and transparent process to define the research questions, identify sources, assess their quality and synthesise the results in a qualitative or quantitative way. The reviews will use scientific sources, but will also draw from the grey literature, to identify uses, tools, challenges, gaps and key application areas. The second phase of the project will use data mining to provide a more quantitative analysis. The two scientific articles that will be published will make operational and policy recommendations. These front-end studies will feed into two other objectives presented below.

## Integration of case studies to identify and test practices and methodologies

Under the leadership of Thuyloi University (Vietnam), this workstream will investigate the effects of the use of sensor and modelling

technologies in three different case studies in Vietnam, Taiwan and Turkey. In the context of the 2030 Agenda, these studies will analyse the interactions between SDG 9 and, respectively, SDG 6 (ensure access to clean water and sanitation for all – Vietnam), 13 (fight against climate change – Taiwan) and 15 (protect and restore terrestrial ecosystems – Turkey). This work will be used to compare methodological innovations, stakeholder involvement and transdisciplinary approaches between case studies from very different socioeconomic and cultural backgrounds, but which are all at the crossroads of several disciplines. It will also be an opportunity to test in real life some of the methodological proposals discussed in the systematic reviews on the use of digital technologies.

### An academic book and methodology guide for sustainability science

Among its contributions to the sustainability science research community, the consortium plans to produce an academic book and a methodology guide based on the research processes of all its partners. The academic book will be a collection of papers from the research carried out during the project on the use of technological innovations in the sustainable management of complex socio-environmental systems. The methodology guide will provide support to other researchers also implementing “computer-assisted” transdisciplinarity,



The three nexuses targeted by the PREMISS case studies.

based on the methods and results of the case studies. The outputs of the PREMISS project will feed into several other projects developed in Vietnam, including those of the ACROSS (Advanced Computational Research for Sustainability Science) international joint

laboratory. The deliverables will be shared within the Pathways Community of Practice, which encompasses all the winning projects of the Belmont Forum Pathways to Sustainability call, but also with local partners and through IRD's Knowledge Communities.

## KEY POINTS

The PREMISS project was prompted by our lack of knowledge of the effects and impacts of technological innovations on the implementation of transdisciplinarity in the sustainable management of complex socio-environmental systems. The added value of this project will lie in the publication of an academic book and a methodology guide proposing practical solutions for implementing these new approaches within the framework of sustainability science. The recommendations developed can be used to support projects that place digital technologies at the heart of their approaches, thereby providing the first steps towards a long-term methodological framework for sustainability science.

# SUSTAINABILITY SCIENCE

**UNDERSTAND, CO-CONSTRUCT, TRANSFORM**

Collective thinking coordinated  
by Olivier Dangles and Claire Fréour

French National Research Institute for Sustainable Development  
Marseille, 2023

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Editorial coordinators: Corinne Lavagne and Marie-Laure Portal-Cabanel

Cover, design and layout: Charlotte Devanz

IRD, Marseille, 2023