

• Sustainability science: Finding sustainable solutions within planetary boundaries

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Background

Protecting the biosphere is now a global priority that demands changes in societies and lifestyles. In response, science is being called upon to provide sustainable solutions, and many are voicing support for us to move faster, advise on public policy, propose alternatives and solve problems. These expectations are well founded, but we need to be better prepared in anticipating new challenges so we can avoid future disasters. Contemporary research remains fragmented, discipline-based and fails to bridge the gap between results and proposed solutions to address the magnitude of the problems. If we are to stand any chance of responding to and coping with environmental crises, we need to work differently together.

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Further reading

CLARK W. C., HARLEY A. G., 2020 – Sustainability science: Toward a synthesis. *Annual Review of Environment and Resources*, 45 : 331-386.

What is sustainability science?

Sustainability science officially emerged as a research field in its own right at the beginning of the 21st century. It looks at the complex interconnections between natural, social and technical systems, and how these interactions affect, over time and space, the planet's life support systems, socioeconomic development and human well-being. Sustainability science is an umbrella term that covers activities as diverse as acquiring new fundamental knowledge, researching technological applications, engaging in sociocultural innovation, bringing about a change in governance and defining new social and economic models. Sustainability science is therefore based on "problem-centred" research, which is rooted in confronting real-world situations, rather than in the underlying dynamics of the scientific disciplines it draws upon. This approach gives researchers a better overall understanding of the main sustainability issues facing our societies, with the aim of providing answers to the 169 targets of the Sustainable Development Goals (SDGs). As a research field, sustainability science has its own collection of concepts and methods, scientific journals, conferences and experts.

Looking ahead to a sustainable future

Questioning what sustainability means is essential to understanding the science that bears its name. A turning point was reached in

2009 with the definition of planetary boundaries in the seminal paper by Johan Rockström and colleagues. This paper examines sustainability in relation to the limits of natural processes that regulate the biosphere, such as climate change and biodiversity loss. Later, in her 2017 book *Doughnut Economics*, economist Kate Raworth backs up planetary boundaries with the concept of the social floor for human rights and needs that are essential for a dignified life on Earth. Today, the global transformation of our societies in both the Global North and Global South is necessary to ensure that we live within these boundaries, in an environmentally safe and socially just space.

The bridge allegory

The way in which sustainability science harnesses and applies knowledge in its practical application bridges the gap between the academic world and societal problems. This unique function is evident in:

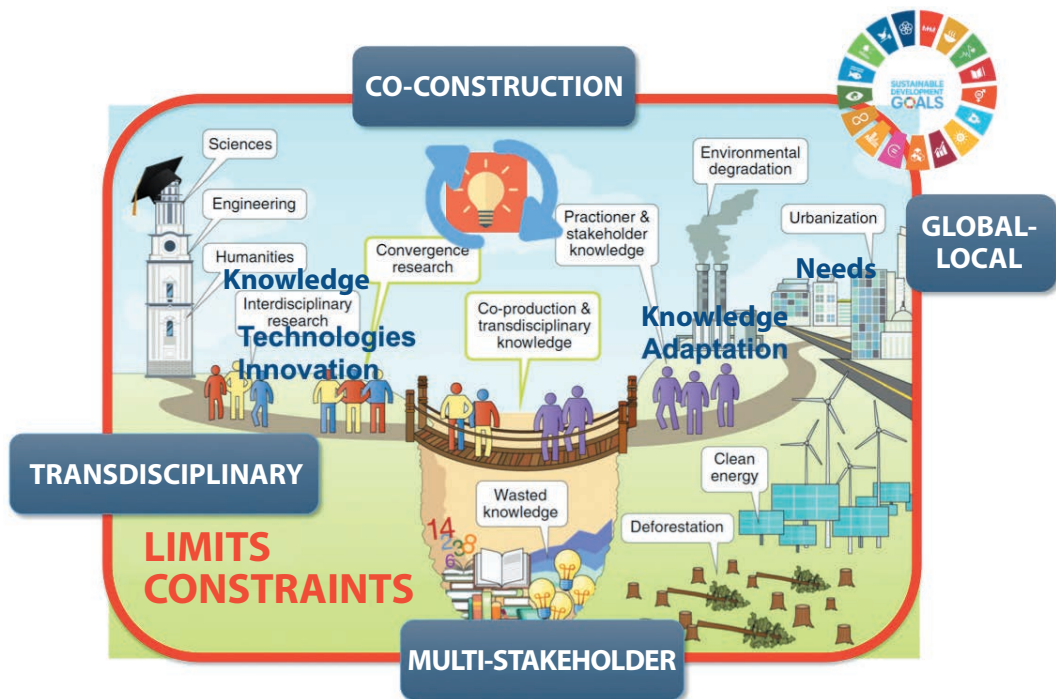
- the high degree of transdisciplinarity, justified by the fact that global problems call for an interdisciplinary and cross-sectoral approach, especially between environmental sciences, social sciences and humanities, and the stakeholders (as in the case of the green SDGs, which interact with the societal and economic SDGs);
- multi-stakeholder co-construction of research projects involving the academic world and a wide range of stakeholders, with the aim of

highlighting issues related to society's needs. This co-construction, which helps us think more effectively about how to produce new knowledge and provide solid elements for decision-making, requires a specific framework for its implementation over a long period of time and for assessing its impact;

- a global-local approach that considers the impact of solutions at different levels to ensure that improving a situation at the local level does not negatively affect other levels.

Legitimacy of IRD

IRD still has several challenges to overcome if it is to fully implement the bridge allegory: cross-pollination between social and environmental sciences is still too limited; the visibility of researchers and their colleagues from the Global South in international journals and debates on sustainability science is poor; the structural and functional organisation of the institute and the academic community is compartmentalised. Still too few research projects



Sustainability science builds a bridge between the research world and societal problems (from Irwin et al., 2018, *Nature Sustainability*, 1: 324-326).

are co-constructed with civil society stakeholders and their impact on sustainable development in partner countries is rarely explored. Moreover, there is little consensus among researchers on the adoption of the 2030 International Agenda. They often see it more as a straitjacket with no real scientific interest rather than an opportunity to rethink the objects, methods and impact of their research. However, because of its history, the geographies it covers and its mission of research for development, IRD has always carried out work focused on the needs of local populations. Collaboration between researchers on areas of common interest in the Global South provides scope for integrated, interdisciplinary and participatory approaches. The opportunities therefore appear promising.

Need for reflexivity

Sustainability science is a young science with blurred boundaries, and it needs to be approached with a certain degree of reflexivity. The normativity it introduces to the notion of sustainability challenges the definition of development, while the urgency of the problems it addresses challenges the possibilities of finding solutions. The multi-stakeholder approach explores the implications of integrating non-scientific knowledge into research practices. The complexity that characterises its systemic approach raises questions about how it can be effectively integrated into policies. Finally, sustainability science reconsiders the role played by research in addressing societal issues, both in terms of its freedom and its responsibility.

KEY POINTS

Sustainability science is a process that generates solutions for a more sustainable world. It therefore concerns not only researchers, but all IRD staff. The idea is not to impose our vision on our staff, but to co-construct it with them, and to show them in a practical way how it might be useful to them while helping us to position ourselves as a major scientific player in the collective effort required to respond to major global challenges. In so doing, we will be able to involve as many people as possible, embrace this strategic vision and generate real and sustainable systemic change for the planet.

SUSTAINABILITY SCIENCE

UNDERSTAND, CO-CONSTRUCT, TRANSFORM

Collective thinking coordinated
by Olivier Dangles and Claire Fréour

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