

Sustainable development and ethics of science – mutual impulses and challenges.

An introduction to the Special Focus

Where, how, and to what extent are scientists and their institutions responsible for addressing interlinked environmental and societal challenges? The introduction to this Special Focus sets the stage for a systematic approach to the multifaceted debates regarding the ethical and epistemological implications of linking science and sustainability.

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Globally and locally, human societies are currently experiencing interlinked environmental and social challenges – climate and biodiversity crises, anti-scientific and anti-democratic populist currents, the corona pandemic and its societal consequences. This has renewed the calls for science – broadly understood as encompassing all academic disciplines (in German: *Wissenschaft*) – to take responsibility and actively contribute to addressing societal challenges in general, and to sustainable development (SD) in particular. Sustainable development is understood in terms of the United Nations’ sense of inter- and intragenerational justice, respecting planetary to local ecological boundaries.

Where, how, and to what extent scientists are responsible, and how they can fulfill this responsibility, has long been debated in the field called “ethics of science”, or “ethics in science”. The latter expression stresses that ethics is not something external to science but an integral, constitutive element within its varying applications (e. g., Berendes 2007, Ammicht Quinn and Potthast 2015). This refers to a broad range of interrelated areas: from 1. professional codes of conduct (“good scientific practice”), and 2. general ethical implications for individual scientists in respect to their socially relevant practices (Ott 1997); to 3. questions of the institutional responsibilities of research and higher education organizations (e. g., Iphofen and O’Mathúna 2022); as well as 4. epistemological implications (e. g., Meisch et al. 2015).

In recent years, challenges of sustainable development for the academic system have been widely and controversially discussed, especially regarding the implications for and of transdisciplinary SD research (e. g., Bergmann et al. 2005, Cockburn and Cundill 2018, Lam et al. 2021; for ethical perspectives, Ziegler and Ott 2015, Potthast 2015, Vogt 2019). However, while the epistemological dimension has already been considered, especially regarding transformation-oriented transdisciplinary SD research, with only a few notable exceptions (Ott 1997 and cf. above) related ethical questions have not been adequately dealt with in depth.



BOX 1: The picture gallery in this Special Focus

The photographs complementing the texts in this Special Focus were created and collected in 2021 for a photo contest project, organized by the Competence Center for Sustainable Development (Kompetenzzentrum für Nachhaltige Entwicklung, KNE) at the University of Tübingen and the “Low-Litter Tübingen” action group (Aktionsbündnis “Müllarmes Tübingen”). This project won the *Environmental Prize* awarded by Stadtwerke Tübingen (SWT). We kindly thank all the photographers for presenting their work and thus providing visual reminders of everyday life and (un)sustainability.

The images are intended to provide a further visual stimulus for reflection, not as illustrations of the texts, but as an independent visual addition.

Two lines of ethical consideration can be identified when combining the above areas: As science increasingly addresses sustainability issues and solutions, and as scientific practice shifts toward interdisciplinarity and transdisciplinarity, will ethical standards in and for research need to change? Which of these standards are affected, and which of them are not; what are the circumstances in which their significance becomes a pressing issue? And vice versa: Which ethical perspectives and related thematic questions have perhaps not been sufficiently considered in SD-oriented (standard) research, and in transformation-oriented SD research?

This Special Focus deals with the ethical implications and requirements of a (possible) transformation of the sciences and the academic system towards sustainable development. In line with this aim, and on the basis of existing reflections on SD research, an interdisciplinary and international group of scholars – in the context of the symposium *Sustainable Development and Ethics of Science: Mutual Impulses and Challenges* (Hannover, DE, November 2–4, 2002) – have identified a range of topics and questions as particularly urgent, and thus relevant. These include: a) epistemological foundations of transdisciplinary sustainability science; b) challenges and needs of education for sustainable development; and c) institutional barriers to sustainable development transformation. These issues and their ethical dimensions are in various ways addressed by contributions to this Special Focus.

A normative epistemology of sustainable development research in practice

There is a long-standing debate about whether and how sustainability-oriented science, as well as the relatively new field of sustainability science, can and should make moral and epistemological value judgments. The approach of application-oriented ethics, which analyzes ethical implications and carefully combines descriptive and prescriptive premises (called “mixed judgments” in moral philosophy), has proved helpful (Potthast 2015, pp. 147 ff.; cf. also Ott 1997). An example from the perspective of

education demonstrates this line of thought: the above-mentioned discussions on norms and value judgments in the field of sustainable development are not new. Questions of values, value-orientation, and value-free science have been debated in educational science for decades. Some contributions of this Special Focus have therefore transferred and adapted existing knowledge on how to deal with this issue, looking for both established critical points and novelties (see also the landmark contribution of Wehling 2022 for situating the “solutionism” debate on SD science in an appropriate context).

Teaching sustainable development science and sustainable development norms while remaining open and pluralistic

Regarding teaching obligations, the general ethical question is which ethical standards should be taught in and for SD research. This no doubt includes certain tensions, for example, advocating directionality towards SD goals while at the same time initiating emancipatory, non-directive education and training processes in research and teaching. Another possible tension arises when addressing the question of whether individual choices about research themes and practices should be reshaped by demands of sustainable development (“the private and the political”). What are good reasons for framing issues that were previously considered private in the context of scientific practice (e.g., diet and mobility behavior) as an institutional matter? Questioning the boundaries between the private and the political on a case-by-case basis, as well as considering overarching ethical principles, remains – in multiple senses – a balancing act that needs to be negotiated participatively and with transparent ethical justifications.

Barriers to sustainability transformation in scientific organizations, especially universities, and the ethical quest for “good” organizations

There is a lack of research literature on the relationship between sustainable development and informal organizational structures. These structures, conceptualized as patterns, create a specific “work culture”. How can such structures be systematically described, analyzed, and further operationalized? An overarching “culture of sustainability” (cf. Holst and Potthast 2024) encompasses both informal and formal structures. Therefore, critical analyses of formal as well as informal organizational structures that hinder, prevent, or indeed promote sustainable development in scientific organizations are highly informative. They show the necessity of evaluative and normative reflections on the concept of “good” scientific organizations in the context of sustainable development (for ethics institutions cf. Brand and Potthast 2021), and on what a “good life” at a university or research institution

might look like – from the perspective of all groups of actors involved.

This Special Focus is composed of three forum articles and five research papers. The central topics of transforming epistemologies, pedagogical practices, as well as institutional structures, are addressed from diverse approaches. This also holds for the answers to “12 questions on sustainability transformation”. We are glad to have **Rafael Ziegler**, German-Canadian transformation researcher, sharing his perspectives (2024, in this issue, pp. 336–337) on linked societal-economic sustainability innovations. The photographs complementing – to be sure: not commenting or illustrating – the papers have been created and collected for a photo competition. Please find further information on this project in box 1.

Opening the *Forum* contributions, **Karen Kastenhofer** (2024, in this issue, pp. 344–350) examines the development of scientific ethos in the face of climate change, questioning how scientists

can maintain their legitimacy while adapting to the urgent topics at hand. She proposes to think about the character of and commitment to a “survival science ethos”, which is informed by recent social studies of science.

Cristian Timmermann and Verina Wild (2024, in this issue, pp. 351–356) delve into sustainability transitions of university hospitals, addressing structural challenges. They emphasize the need for a nuanced understanding of the incentive structures and ethical norms that influence researchers, physicians, and other staff, aiming to prevent deadlocks in the implementation of sustainability initiatives, deadlocks emerging despite a shared consensus on the necessity of such initiatives.

Nicola Banwell and Camille Roelens (2024, in this issue, pp. 357–362) challenge the prevalent, so called “techno-solutionism”, in engineering education. Their paper advocates ethical reflections and critical discussions about technology’s role in sustainability, aiming to reshape didactical as well as pedagogical approaches by being more transparent in addressing the moral values at stake.

SAMUEL VERBONCU 2021
Kaputtes Glas | Broken glass





ANNA BUZDOGÀN 2021
Frühlingserwachen | Spring awakening

The section of research papers begins with **Ann-Kathrin Schlieszus, Johanna Weselek, and Alexander Siegmund (2024, in this issue, pp. 363–371)**, who also investigate teaching practices. They explore the role conflicts faced by university educators teaching sustainability, highlighting how these conflicts can become opportunities for learning and development in higher education contexts.

Andrei Nutas (2024, in this issue, pp. 373–380) critiques AI-driven solutionism, focusing on structural issues that transgress specific fields of action. He argues that an overemphasis on technical solutions can obscure the ethical and social complexities inherent in sustainability challenges. He advocates for a balanced approach that incorporates diverse values and fosters epistemic humility.

Focusing on the epistemic level in practice, **Simon Meisch (2024, in this issue, pp. 381–388)** positions justice as the central social

mission of participatory sustainability research, highlighting its role in knowledge production. By introducing the concept of epistemic justice, he argues for a deeper engagement with the processes and structures of knowledge production.

Bringing epistemic questions into an exemplary context, **Uta Eser and Claudia Bieling (2024, in this issue, pp. 389–396)** reflect on the transformation of regional agrifood systems, focusing on the interplay of normativity and solution-oriented approaches within their *Eco-Valuation* project. They demonstrate how a focus on discussing inherent moral values of different stakeholders can foster mutual respect and help to shape a common ground for discussions of conflicting interests.

The contribution by **Marc Dusseldorp, Elisabeth Does, Rafaela Hillerbrand, and Oliver Parodi (2024, in this issue, pp. 397–406)** addresses the development of a code of ethics for Real-world Laboratories (RwL). The authors outline the importance of ethical codes in fostering awareness and guiding practices within academia and beyond, particularly in respect to transdisciplinary contexts and their specific ethical challenges.

Notwithstanding their differences in approaches and positioning, the contributions highlight the need for ethical reflection of sustainability transformations by and in academia, demonstrating how this reflection is possible and productive. They underscore the interconnectedness of teaching, research, and ethical practice in navigating these essential transitions – confirming that ethics is not a roadblock but rather an enabler of such processes on the way towards more sustainability in science and societies.

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