

Editorial

Sustainability and Science – Challenges for Theory and Practice

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ABSTRACT

This editorial article for the special issue of *Sustainable Development* ‘Sustainability and science – challenges for theory and practice’ presents an introduction to the topics and reviews the seven accepted contributions. Four themes were perceived as challenges for the relationship between sustainability and science.

1. Socio-political sciences and religion and their implications for the concept of sustainable development.
2. Soft systems methodologies and indicators and their contribution to sustainability applications.
3. Management sciences and policy development within sustainable development practice.
4. The design disciplines and their adaptation of sustainable development.

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SINCE THE LATE 1980S, HUMANS’ INFLUENCE ON THE GLOBAL ENVIRONMENT HAS BEEN WIDELY DISCUSSED ON AN international level. In 1987, the Brundtland Commission formulated probably the most commonly quoted definition of sustainable development: development that ‘meets the needs of the present generation without compromising the ability of future generations to meet their own needs’ (Brundtland Commission, 1987, p. 55).

‘Science for sustainability’ or ‘sustainability science’¹ means treating sustainable development from a scientific perspective.² The approach emerged in different academic disciplines in the last decades of the 20th century, and

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¹The advantage with the term ‘sustainability science’ is that it can comprise science ‘for’, ‘in’ and ‘about’ sustainability, which all mean different things.

²The term ‘scientific’ refers here to both the natural sciences and to the humanities, economy and social sciences.

quickly became a main issue in different discourses. In early periods, sustainability science focused mostly on solutions for specific, eco-technical problems; however, the insight that responsibility for the environment is *de facto* largely dealt with by articulating codes and regulations for appropriate behavior towards one's surroundings and fellow human beings brought about a vast interest from other fields such as political sciences, ethnology, geography etc. As in the third article of the authors of this special issue pointed out, 'underlying problem definitions strongly shape the mode by which a particular initiative is managed'.

The need to examine values and norms within the socio-cultural, ethical, professional and technological dimensions of sustainability (Williams, 2007) goes along with a call for interdisciplinary cooperation to meet real problems connected to a sustainable development. Despite this fact, many current research projects towards sustainability are still based on cook-bookish guides and regulations, and can be characterized as reductionistic – focusing primarily on techno-environmental issues and ignoring the various contextual and structural aspects surrounding sustainable development *in praxi* (Williamson *et al.*, 2003, pp. 19–20). This may be not surprising, considering that positivism-grounded ways of thinking have been dominating the Western societies since the 17th century.

Dualist instead of dialectic thinking is one reason for problems with the concept of sustainability, which is in a way immanent in the epistemology of sustainability *itself*. On the one hand, the concept derives from sciences such as ecology and physics; on the other hand it points to the limits of these sciences, and acquires legitimacy referring to imperatives that clearly stand beyond them. As M. Redclift remarks, 'married to the idea of development' sustainability represents the Modernist tradition, but at the same time its emphasis on cultural diversity is a clear expression of a post-modern way of thinking (Redclift and Sage, 1994).

Connected with the dualist thinking is the idea of using nature as a source for human progress. What has been overlooked in the past by the belief in the 'infinite capacity of human reason to control, dominate and put to work the forces of nature' (Pérez-Gómez, 1983, p. 273) is that it resulted in the devastation of human habitat, a consequence we now have to face. Thus the emergence of the problem of sustainability may be also seen in terms of a relatively recent transition from the predominance of 'external risks' (risks that we feared from the natural environment) to that of 'manufactured risks' (risks that are a result of human impact on the world).³ The 'manufactured risks' are a direct effect of the increasing application of technology in response to such conditions as increasing populations and desired higher standards of living (Giddens, 1999; Williamson *et al.*, 2003).

This special issue of *Sustainable Development*, 'Sustainability and science – challenges for theory and practice', aims to present a wide spectrum of topics within the overarching 'umbrella' of science in and for sustainability. The issue, which is represented by seven quality papers, focuses on the promotion and application of new concepts and applications; approaches and merging trends leading to innovative theories in sustainability and science. The articles in this special issue attempt to view sustainability science as a multi-perspective endeavor. Thus, unorthodox knowledge concepts, that might benefit scientific or socio-political interaction, are taken into account as well. The aim of the issue is to transgress the boundaries of conventional theories and to look both ways: the effort of the different sciences to meet sustainability challenges *and* the scientific and disciplinary development in working with these challenges. According to Kuhn, any science dies without revolutions, and hopefully some ideas in the articles will trigger further research and a development towards sustainability science that is adaptive, operationalizable, normative in content, and communication enhancing.

The first article, 'Deconstructing the development paradigm: a post-structural perspective', claims that the science of sustainability is inclusive of values and instruments, which stand for a sustainable development. The article discusses conditions for developing these by traversing through stages of the knowledge society and conventional research practices and by giving examples from life sciences and energy policies. It illustrates how a 'technicalization of science' leads to an 'epistemological ethnocentrism' and proposes a contextualization of knowledge for the science of sustainability for a bottom-up development and the empowerment of citizens through knowledge generation.

The second article, 'Sustainable consumption as a means to self-realization: a Hindu perspective', moves on the interface between philosophy, politics and religion. The article discusses a particular religious vision of

³A. Giddens in one of his lectures delivered within BBC Reith series (1999), remarks 'At a certain point... we started worrying less about what nature can do to us, and more about what we have done to nature. This marks the transition from the predominance of external risks to that of manufactured risks' (Giddens, 1999).

self-actualization – Hinduism, and this vision is explored in the context of the escalating consumption patterns of India's rapidly growing middle class, and exemplified by a case study – the city of Delhi. The article claims that sustainability, viewed explicitly in terms of a personal and individual human vocation, lies at the heart of fundamentally transforming human lifestyles. Sustainability in such a context becomes the means to self-actualization, and not the end in itself.

From a multidisciplinary perspective, the third article, 'Approaches for understanding and embedding stakeholder realities in mangrove rehabilitation processes in Southeast Asia: lessons learnt from Mahakam delta, East Kalimantan', applies a soft systems methodology (SSM) to a particular sustainability issue. The article analyses the implementation process growing out of a policy environment intended to promote the rehabilitation of mangrove ecosystems. The analysis is based on research conducted in 2007–09 in the Mahakam delta in East Kalimantan, Indonesian Borneo. The case from Mahakam reveals that there is no stakeholder consensus in terms of problem definitions and management priorities of the coastal delta area. Through a structured systemic inquiry, the analysis explores the problem situation related to the sustainability of mangrove systems for coastal environments and people. The article points to significant power imbalances in the system, not only between human actors, but also between the discourses of conservation and production. It implies that a strategic planning process is a precondition to consider different stakeholders' perspectives in the system.

The fourth article, 'Mediation of tropical forest interests through empowerment to locals by means of ecological indicators', elaborates how tension between global and local interests arises. Further, it investigates differences in the acquisition of knowledge about the forest ecosystem and suggests ways to mediate and negotiate between the interested parties. Catchment forest management at Mt. Kilimanjaro, Tanzania, is the reference case for this research.

The paper suggests a framework for ecological methods, where ecological semantics can be a mediator between nature (ecology) and culture (society) in order to evolve a common understanding for environmental sustainability and valuation of ecosystem services. From this another framework for mediating ecological indicators is developed in order to keep the elements of local versus global interest, nature versus society and epistemology versus ontology together in one system.

Dealing explicitly with management sciences and policy development within sustainable development practice, the fifth article, 'Managing solid waste (MSW) from a system perspective: a comparative study of Dalian, China, and Waterloo, Canada', provides a comprehensive investigation into the complexity of integrated solid waste management. The article compares and contrasts two cases, the Region of Waterloo in Canada and Dalian in China, exploring the reasons for the different management approaches between the two cases. The results show that, in some aspects, differences between the two waste management systems are tightly linked with respective social and economic contexts, which are difficult to change, whereas other differences can be attributed mainly to management strategies and tools. Suggestions are provided on waste planning, the development of waste diversion programs and waste treatment industries, the design of new programs and the role of the local government.

Traversing into the design disciplines and their adaptation of sustainable development, the sixth article, 'Exploring relationships between universal design and social sustainable development: some methodological aspects to the debate on the sciences of sustainability', discusses methodological, practical conditions and consequences on seeing universal design (UD) and social sustainable development (SSD) in concert with each other. The article exemplifies how UD can be related to SSD and discusses how far the former presents a fruitful methodological approach for SSD. The paper discusses common goals and relevant theories in both fields. It examines methods and presents examples how designers contribute with inclusive and socially sustainable solutions and how insights from UD can be used for interplay with SSD in research and practice.

The last article of this special issue thematizes the design discipline and sustainability from an educational and curriculum point of view. The main focus of the articles is how the notion of design responsibility related to sustainability can be integrated into design education, describing ways of training and encouraging students to become responsible and sustainable oriented designers. Using examples from the curriculum of the Kolding School of Design in Denmark, the paper employs both practice- and theory-based learning approaches. Further, it argues for the value of teaching design responsibility to imbue design students with the knowledge and confidence that sustainable thinking and practice in design can make a difference.

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