Science for the global common good

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Future: diverse and non-existent

Today, the future is equally diverse and non-existent. In the last two decades, in addition to the countries of the 'West', the major emerging economies, including India, China, Russia, Brazil, South Africa, and regional powers have been shaping the economic, political and cultural interdependencies of a more complex, dynamic, accelerated world. Social inequalities are further exacerbated by the socially unequal distribution of risks emanating from climate change, (wo)man-made technologies, the financial system or global terrorism, to name just a few of the unintended consequences of the first modernity. At the same time, precisely these risks caused by climate change, resource destruction and species extinction are limiting development opportunities and global scope for action much more than ever before.

It is our globally joint task, and especially the task of our political leaders, to resolve this contradiction. How can we assure that future remains open and to be shaped by those living in it? Increasingly it becomes clear that global sustainable development remains unreachable if the goals of the Paris Agreement are not met. Global warming has to be limited to 1.5, maximum 2°C. All predictions indicate that beyond that limit the to be expected disturbances in climate and weather will have immense effects on food systems, supply chains, built infrastructures and transport systems, with the respective secondary consequences of rising poverty, political and economic instabilities. The coming years thus are decisive in aligning action guided by the Agenda 2030 of the United Nations with the meeting of the Paris Agreement. The COVID-19 recovery funds should act as additional lever.

In addition to these immediate actions necessary, the structural foundations for joint, global, cross-sectoral and -scalar governance have to be

developed further and partly built from scratch. This chapter reflects on these structural foundations for global governance for sustainable futures out of the perspective of the scientific and knowledge infrastructures that enable 'good', transparent, fair governance in which decision-makers can be held accountable. 'Global governance' here refers to formal, informal and the many hybrid forms of governance inbetween and across scale-levels, sectoral boundaries and political borders.

Knowing: foundational to governance for sustainability

Cognition and the question of what is regarded in, and by, a given group of social beings as worth knowing and reflecting on, as worth protecting or sharing, meaning as 'knowledge', are constitutive to any reflection of (wo)man's origins, present forms of existence and futures. Further, they are interdependently tied to the social and physical environments we inhabit and shape. Processes of meaning-construction and sense-making determine how we see our environments, read them and, based on these readings, design norms, rules and a wide range of different types of institutions for regulating and ordering everyday lives. The processes of sense-making themselves are influenced by former intersubjectively shared interpretations of reality and by the institutional structures and materialities they have resulted in, while at the same time they guide actors in their everyday practices towards the realisation of imaginaries and visions of future.

Thus, how we know our world – as individuals and as societies –, its bio- and atmosphere, the forms of social organisation and cultural engagement, political and economic regimes, technologies and infrastructures devised, and how we attach meaning to it crucially determines our normative outlook and our human, institutional and technological capacities to govern. Both, normative orientation and human, institutional and technological capacities to govern, are the result of societal formation and socialisation processes, harnessed in the institutions of scientific and non-scientific, local and everyday knowledge systems. These capacities and normative orientations lay the foundation for transformational processes along the lines of the Agenda 2030 and as required for meeting the climate goals. Yet, substantial differences in scientific capacity and sustainability-related literacies prevail and challenge world society to know, negotiate and govern global sustainability challenges together.

Global science: a landscape of difference

Modern science, as developed since Enlightenment in 18th century Europe and diversified since then (de Solla Price 1963), has acted as engine of linear innovation and economic growth, often without taking environmental and social consequences sufficiently into account. Environmental damages were largely tackled ex post. Social change was regarded as necessarily following technological progress, with income and transfer increases being sufficiently high to compensate for the social costs of progress. It is only more recently, with a broader recognition of ecological limits to growth (Rockström et al. 2017), that sustainability-focused discourses have gained traction – in international and national science systems, in politics and societies. These 'planetary boundaries' thus challenge the former underlying logic of scientific knowledge production to act as engine of linear growth, demanding a reflection of scientific knowledge production itself as well as of science-to-policy and science-to-practice interfaces.

Up to today, public and private expenditures for scientific knowledge generation continue to vary substantially between regions and countries ranging from 0.23% of GDP in Indonesia in 2017, 0.51% in Tanzania in 2013 to 0.79% in Kenya 2010, 0.35% in Namibia 2014, 0.65% in India and 0.83% in South Africa 2017, or 3.13% in Germany in 2018 for comparison (UIS 2021). While the European Union aims for 3% of GDP spending for research and development (R&D), the African Union aims for 1% of GDP. According to data by the OECD and UNESCO, in 2013 71% of all R&D expenditure occurred in the OECD, further 21% in China and 8% in the „rest of the world" (BMBF 2016: 64). This situation of grossly underfunded science systems and respective global crevices affects all disciplinary and thematic fields. Further, the valuing of basic versus applied research varies substantially, with a strong bias towards directly applicable forms of research in lower-level-financed systems. The International Science Council (2021) further points to the system-inherent priorisation of research that contributes to the solving of national challenges. Research addressing global challenges and matters of the global common good has to compete with national interests. While the vast majority of research funding is in-country funding, some goes into bilateral funding schemes. The share of multilateral science funding with universal access is estimated to amount to 2–10% of the overall US$70 billion p.a. of current science funding globally (ISC 2021:14). This is also reflected in the degrees and forms of international, transregional cooperation practised in research projects: about 80% of research projects involve only domestic collaboration, 15% bilateral and only 5% multilateral cooperation (Digital Science 2020).

Historically grown path dependencies around material (i.e. labs, access to sampling technologies etc.) and immaterial (i.e. funding sources, language of research, networks, disciplinary vs. thematic organisation of system) science infrastructures heavily shape scientific knowledge production across borders. For the field of tropical marine sustainability research, Partelow et al. (2020) illustrate how existing power imbalances between well-funded research systems and underfunded ones are being perpetuated over time. The majority of research agendas are set by those science systems where funding comes from, and this also at global level or in transnational cooperation. This results in agenda setting processes based on priority setting out of an external and often purely scientific perspective, which lacks local fit. Concerns of local problem identification and research that produces knowledges that later fit the local context and for the diffusion of which the respective networks have been built during the research process play a minor role. In sectors of immediate interest to international efforts of poverty alleviation, for instance, such as agriculture and fisheries, the scientific knowledge production heavily depends on, and is co-opted by, international funding, e.g. donors or international research organisations and funders (Pingali et al. 2016). Donor-funded and -oriented research, including CGIAR-level research, in consequence plays an important and often politically influential role.

Science for facilitating transformational processes towards sustainability is in consequence globally challenged by (a) the non-existence of one global science system united by jointly defined standards, (b) substantial power imbalances and dependencies and (c) the lack of multilateral structures, which could facilitate the formulation of joint standards and offer multilateral science funding accessible for all national and regional science systems. Instead, the lack of a joint definition of what actually constitutes science in all its diversity and a joint understanding of the institutional structures on national, regional and multilateral levels needed for jointly addressing questions of the global common good results in a continued reification of inequalities in the capacities to know and govern global challenges.

Science for the global common good: uniting frame or accelerator of inequality?

Climate change and resource degradation, demographic change and geopolitical power shifts are first order global megatrends, which since centuries lay the structures that determine what type of dynamics unfold among themselves and between them and that entail second order mega-

trends, such as rising social inequalities, urbanisation, digitalisation, globalisation and regionalisation, and others. The above tried to sketch out some of the core challenges of world society coming together to jointly define visions of a common future and for implementing concrete actions, backed up by the required human, institutional, technological and infrastructural capacities required.

While it is clear that these cannot all be solved by science alone, I argue that a substantially more focused reflection and transformation of the global science landscape and its funding structures is required for enabling the grand transformational processes towards sustainability needed for aligning the Agenda 2030 and the Paris Agreement and indeed keeping global warming at below 2°C. Concretely, I regard the following structural changes as necessary:

- *Foster national and bilateral Science Cooperation* for fair cooperations in sustainability transformations.
- *Joint scientific Standard Development:* develop – via UNESCO – a globally joint understanding and set of standards for scientific practice, integrity and quality assurance; adopt nationally determined science contributions to the fulfilment of Agenda 2030 and the Paris Agreement in the respective Conferences of the Parties of UNFCCC as well as on the level of the UN General Assembly.
- *National and bilateral Science Funding:* raise awareness amongst national governments and regional bodies for the importance of interdisciplinary sustainability science for wealth reallocation from current to future generations and for securing the global common good.
- *Multilateral Science Funding:* substantially increase science funding allocated through multilateral organisations and platforms including the UNESCO, Future Earth, the Belmont Forum, through IPCC and IPBES. Multilateral science funding, allowing for a diversification and reallocation of scientific capacities across borders, should make up a minimum of 30% of the global science funding, with a thematic focus on the global challenges of the climate crisis, biodiversity loss, the rise of social inequalities, decarbonisation of economies and democracy protection.

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