From climate economics to planetary boundaries and global commons – the next paradigm shift

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A very basic word cloud based on Dirk Messner's publication record (from 1999 to 2017) reveals that the words occurring most often, even before his own name, are: 'global', 'development', 'governance', followed (after his name) by 'development policy', 'cooperation', 'international', 'transformation', 'peace' and 'climate change'. This seems to paint a very accurate picture of Dirk Messner, the relentless advocate in pursuit of an equitable global transformation towards a sustainable future.

After having met on several occasions briefly, I got to know Dirk Messner better when he became a member, and eventually chair, of the Scientific Advisory Board of the Potsdam Institute for Climate Impact Research (PIK). Dirk turned this advisory board into one that assumed an active role in PIK's development. He played a decisive part for PIK not only by setting high standards for its scientific excellence but also by encouraging an interdisciplinary research agenda and making this knowledge available to policy makers. Dirk has always followed a clear principle: Policy advice must be grounded in excellent interdisciplinary research. This, of course, is a conviction he was committed to throughout his long term as a member of the WBGU (German Advisory Council on Global Change).

His time as a member of the WBGU coincided with my co-chairmanship at the IPCC. In our discussions it became increasingly clear that sustainable development is only possible within planetary boundaries. Planetary boundaries can only be implemented as global guard rails when user rights for common-pool resources (e.g. the atmosphere or the oceans) are formally or informally implemented. We define common-pool resources as material or immaterial goods for which it is costly (but not impossible) to exclude users. As common-pool resources can be overused, the use by one party rivals the use by another (e.g. emitting greenhouse gases into the

atmosphere). The explicit assignment of user rights transforms a common-pool resource into a commons. This transformation requires a global und local governance structure. Dirk was always willing to discuss these issues on airplanes, on the phone, in awful hotel lobbies – unfortunately very rarely over a decent meal and a reasonable bottle of wine. Nevertheless, these discussions have shaped my personal research agenda at PIK substantially.

Dirk was also instrumental in the development of the Mercator Research Institute on Global Commons and Climate Change (MCC) when he led the first review panel in 2016. In the shadow of a disappointing UNFCCC COP 2009 in Copenhagen, the MCC was established to shift political and social discourse from incremental (if at all) advances to holistic pathways and a spectrum of viable solutions. Decision makers need science-based solution-oriented options – a map that can describe but not prescribe a pathway. The MCC's goal was to lay out appropriate governance regimes for the common-pool resources and elicit political economy aspects of governing the global commons. Dirk supported and guided the interdisciplinary and complementary set-up of PIK and MCC. Almost a decade later, we have reached a new junction: I am confident that planetary boundaries and the subsequent governance of commons at different scales are ushering in the next paradigm shift in global sustainability research.

The impact of climate change on planetary boundaries can be global or local. Transgressing some planetary boundaries, such as the atmosphere, creates damages on a global scale; thus, the spatial distribution of the polluting activity does not matter. Crossing other planetary boundaries, such as nitrogen and biosphere integrity, manifests at a regional or even sub-regional scale. Still, these planetary boundaries have regional-global interlinkages (Kalkuhl et al. n.d.). Neither economics nor political science is currently prepared to provide an integrative framework, which would allow to study these problems from a decision theoretic angle. Such an approach would enable policymakers to include natural capital, the precautionary principle, and global and regional linkages in a comprehensive approach to overcome counterproductive dichotomies like economic development versus environmental integrity, efficiency versus fairness, global cooperation versus local action.

Dirk Messner's engagement for an interdisciplinary research agenda pointed to a crucial quality that I came to highly appreciate: He addresses 'the environmental issue' explicitly not in a unilateral way but with the profound understanding that climate protection is much more than a question of environmental politics and thus has to be embedded in a

broader policy context. His work shows his capability to bridge the two disciplines: His doctoral thesis, an early example, addressed the concept of systemic competitiveness and the role governance design and capacity play in how so-called developing countries fare in a global market economy. Significantly, the dimension of inequality has always been a key component in his publication record. In his roles as director of the German Development Institute and as co-chair of the German Sustainable Development Solutions Network, he has no less than expected his own scientific inquiry and institutional leadership to incorporate in all endeavours the ultimate goal to increase human welfare and to decrease inequality. All these interests and competencies are now called upon.

Despite its dependency on nature, humankind is exploiting the biosphere's finite capacity at unsustainable rates, amplified by growing global inequality. Finding effective governance mechanisms for a transformation towards a resilient Earth system and human well-being is of crucial importance. With the amendment of its Climate Protection Law, the German government introduced a credible binding commitment to ambitious climate targets in early 2021. Shortly after, the European Commission published its proposal 'Fit for 55' aimed at implementing its Green Deal. This historic policy plan introduces measures for safeguarding social cohesion, the Social Climate Fund. In this pivotal decade it takes a person like Dirk Messner as the President of Europe's largest environmental agency, the German Environmental Agency (UBA), to facilitate such paradigm shifts at the national, the European and, in the end, the global level. We will need a profound transformation that is politically legitimised by social compensation mechanisms. An important step will be the establishment of a second emissions trading market for the sectors building and mobility – first in Germany, but now also envisaged for Europe. The EU has a chance to implement a comprehensive emissions trading scheme including all relevant sectors. The national and European debate will benefit greatly from Dirks' intellectual leadership.

In his recent comprehensive review, the economist Sir Partha Dasgupta (2021) proposes an inclusive wealth paradigm that puts natural capital, notably biodiversity, at the very centre of economics. From an economic point of view, assigning a value to the withdrawal from natural common good resources, such as the atmosphere or biodiversity, is inevitable if we want to protect the global commons. If the wealth of nations is to be maintained, or even increased, all relevant social costs must find their way into accounting. For example, the price for meat should account for the effects that the use of antibiotics in livestock farming has on the environment and human health. Applying the same principle, water eutrophication caused

by industrial fertilisation and waste water needs to be reflected in pricing. Currently, these costs are passed on to society in general. However, market economies only lead to increasing prosperity if those who cause these costs also pay for them. Thus, if production generates so-called externalities, i.e. costs that are passed on to the general public, they must be reallocated to the polluters. This internalisation, the inclusion of all costs in the economic calculations of companies, can be achieved via pricing of externalities. However, without a comprehensive analytical framework, and its translation into institutions, humankind will not be able to manage the twin crises of climate and biosphere integrity. For this purpose, multilateral institutions are needed that introduce prices for emissions, subsidise countries for providing eco-system services, manage land-use change or manage cap-and-trade systems.

In Germany, we estimate that externalities amount to at least 455 billion euro, and it could be as high as 671 billion euro, as data for some damages is incomplete (Kalkuhl et al., 2021). These costs are currently borne by society at large. Imposing taxes to cover externalities in critical sectors can shift consumer and producer behaviour to more sustainable products. However, for many of these externalities the costs are borne by the entire society, because data is lacking. A systematic measurement of external costs of (economic) activities is necessary to implement targeted measures to protect nature, to be able to tax the polluter and to gain public support for climate change policies. The UBA has taken first important steps for a systematic data collection, but efforts must be increased to enable targeted and transparent environmental policies based on scientific evidence and to monitor its implementation.

Neither rising costs (for example, of energy consumption via the second ETS) nor taxing externalities (for example, of meat production) should be implemented without concurrently establishing transparent ways of easing the transformation for socio-economically weaker households. I am in full agreement with Dirk when he emphasises the importance of justice and just transition, which requires the right mix of instruments. After all, the CO_2-consumption of high-income households is higher than that of low-income households, because, for example, they live in larger homes and drive heavier cars. So if emissions are given a price, they consequently pay more. The revenues have to be returned to citizens. The reduction of the electricity tax in the short term, covering the cost reallocation of financing the renewable energy law ('EEG-Umlage') via CO_2-pricing, and a direct climate dividend in the long term are possible options. The message is very clear: Climate protection and social compensation go hand in hand. We have the knowledge and the tools to address social inequality and

climate change at the same time. The UBA, and especially its Director, will likely assume leadership roles in communicating this clearly, to decision makers and to society.

The discussion about the Carbon Border Adjustment Measure (CBAM) included in the EU's 'Fit for 55' proposal highlights another challenge: Climate politics is a multi-level game. The CBAM is meant to safeguard European industries from the pressure of international competition and to encourage other countries to introduce CO_2-prices. However, the European transformation alone will not suffice in stabilising the Earth system. It can only be successful if it is embedded in global coordination and if other large emitters follow suit. Before unilateral decisions are implemented, the EU should invest political capital in global cooperation. Bringing on board and agreeing on a joint carbon price with the US and China alone would already cover about half of the global emissions. Dirk Messner, a skilled communicator and expert of multi-level governance, is perfectly placed to guide such political considerations.

Nothing of the above said needs to be explained to Dirk Messner. He understands the cooperation problems related to global commons from both a political and an economic view perfectly well. In fact, it was him who put me in touch with the late Elinor Ostrom, who was awarded the Nobel Prize in Economics for her work on the governance of the commons. It was Ostrom who demonstrated that the tragedy of the commons is not inevitable. With polycentric institutions we might be able to turn the climate tragedy of the commons into a drama. In this drama, the UBA under the leadership of Dirk will be needed to shape and monitor science-based policies and to transparently communicate them in order to create public trust.

It seems fitting, then, that I close with a quote from Professor Ostrom: "If we just wait – that would be stupid." Dear Dirk, you are an inspiration and a trusted friend with exemplary integrity. You have always had a visionary and holistic view ahead of your time, and you now have the position to advance an integrative framework and the corresponding institutional agenda. We have our work cut out for the coming years, and I am looking forward to tackling this governance complexity of climate change, biodiversity and socio-economic equity at multiple scales with you as President of the UBA. Happy birthday – welcome to the club!

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