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FOCUS

Thoughts on climate research and policy

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The climate issue requires both scientific analysis and political decision-making. Perceiving climatic impacts, possibilities and necessities through the lens of political interests will hardly achieve long-term success. Quite to the contrary, a dispassionate scientific analysis is needed to present the various options in detail and thus to enable normative political decisions. To this end, climate research is in need of self-reflection. Fundamental scientific values such as contradiction, openness, sustainability, independence of individuals and falsification, enable science to unfold its potential as an action-guiding knowledge provider. For this purpose, the natural sciences need input from the social sciences, cultural studies and a discerning public.

Knowledge of climate change

The global climate – what we call the statistics of our weather – is changing due to the impact of human activities. Temperature frequency distributions are presently witnessing a shift towards higher values that will continue almost everywhere in the foreseeable future; sea levels are rising and rainfall quantities are changing. Some, but not all, extremes will change. The primary motor behind these changes is the release of greenhouse gases. That is the *scientific construct* behind man-made climate change.

But what is the public's perception of climate change? That the climate is changing because of humanity. That the weather is less reliable than it used to be, and that the seasons are less predictable. Extreme weather takes on catastrophic, unheard-of shapes. What is the reason behind this? Human greed and stupidity. The mechanism behind it: justice – the revenge of nature. If our climate changes, civilisation is jeopardised; entire cultures will perish, such as Viking settlements in Greenland. That is the *media-cultural construct* of climate change, consistent with *our culture* and perpetuated by our *media*.

These two constructs compete in their interpretations of a complex environment; they are two "actors" in the knowledge market.

Of course, the practice of science is also influenced by the construct of media and culture because scientists themselves are always also caught up in their own culture. Their culture conditions their perception, guides them in their scientific research and their readiness to accept certain answers as argumentatively sufficient.

Post-normal science

If science must remain uncertain in its concrete statements, if scientific statements are of great practical import to formulating policies and making urgent decisions while affecting societal values, then that kind of science is less and less driven by pure "curiosity" but rather by the usefulness of its possible statements to decision-making and politics. It becomes "post-normal" (Funtowicz and Ravetz, 1985). Methodological quality no longer occupies centre stage, but rather societal acceptance.

Science in its post-normal stage relies on its consistence with cultural constructs. Knowledge claims are not only raised by recognised scien-

tists, but also by other experts serving specific interests.

Climate research is presently in a post-normal state. Its inherent uncertainties are enormous since future projections must be made, and such futures can only be presented in the form of models and under conditions which have yet to be observed. This lack of knowledge has nothing to do with incapacity on the part of the scientists. Rather the problem lies in the scarcity of available facts and the incomplete nature of instrumental data – it spans much too short a period for the collection of reliable data necessary for the description of climatic variations across decades and centuries. Naturally, arguments exist which favour one answer or the other, and some considerations of plausibility allow us to exclude certain developments as unlikely or even impossible. However, there remains a degree of uncertainty which may not substantially diminish for many years to come.

Under such circumstances, representatives of societal interests tend to pick those knowledge claims which best support their position. The scientifically untenable film *The Day After Tomorrow* has been praised for increasing public awareness; political and scientific achievements were mixed up when the Nobel Peace Prize was awarded to Al Gore and the IPCC; professors have explained to the public – from a scientific angle – the supposedly inevitable reactions to the climate change. In addition to such alarmist tendencies, there is also the sceptical counterpart, manifesting itself in such creations as Micheal Crichton's *State of Fear* or the film *The Great Swindle*.

None of this can be considered what is rather vaguely described as "good science" where critical inquiry, clever testing and unconventional ideas result in real progress, rather than just being useful in the implementation of a policy which is perceived as being right.

The honest broker

But how should scientists deal with the present post-normal situation when both claims – conducting good science and giving sound advice to the public – are accepted as legitimate? For the analysis to achieve depth and substance it needs the help of the social sciences and cultural studies. Up to now, these two fields of study have more or less stood on the sidelines, while in fact there exist some excellent examples of successful supplementary social science research, e.g., the "Honest Broker" analysis by Roger A. Pielke, Jr. (Pielke, 2007).

According to this analysis, there are five types of scientists who engage in communication with the public in different ways. "Pure scientists" are essentially driven by curiosity and have little interest in putting their research results in a societal context. "Science arbiters" enable a correct understanding of indisputable scientific facts. Both types fit well into "normal" science which is able to answer questions with a high degree of certainty, and whose answers are non-controversial regarding possible societal applications. "Issue advocates" invest their scientific competence in the furthering of a value-oriented agenda. The consequences of scientific insight are narrowed to an interest-compliant "solution". The "honest brokers" widen the scope of practical options, thus enabling the political process to choose the "solution" which is desired by society. The fifth type refers to the "stealth issue advocates" who are, by way of their actions, "issue advocates", while pretending to be "science arbiters" or "honest brokers".

Obviously, the "honest broker" is best suited to enable society to choose solutions to its controversies, despite uncertain knowledge about interconnections and possibilities, in a manner which is both rational and consistent with its values.

Sustainability

Science is a social activity which has the objective of *creating new knowledge*. Just like any other social activity, science can be conducted sustainably – or not.

Society expects science to create knowledge in order to aid in the understanding of a complex environment. Why do we entrust "science" with this role? The answer lies in the methods used by science. Scientific methods ensure that we are usually offered "coherent" interpretations allowing for actions which lead to the desired outcomes. "Incorrect" interpretations do occur, but tend to be rare. They are usually discovered sooner or later and replaced by a "coherent" interpretation.

According to science theorist Robert K. Merton (Stehr, 1978; Grundmann, 2010), there are a few significant principles, such as disinterestedness and organised scepticism which present an idealisation which can never be fully realised. However, such principles do describe what the public views as a prerequisite for accepting knowledge claims. Only if such principles are respected, scientific practice can be conducted in a sustainable way, or, more specifically, only then will the public, the media and decision-makers listen to our current post-graduate students as closely 20 years from now as they listen to us scientists today.

So, where does climate research stand when seen in the light of Merton's criteria? *Do self-serving interests influence research results?* There is no agreement on this matter: Two camps, the "sceptics" and the "alarmists", vehemently argue with each other over the political usefulness of their statements, while both groups only partly accept results as "correct" if they contradict their fundamental convictions. *Do knowledge claims undergo critical analysis and attempts at falsification by critical professional colleagues?* – This area also has its deficits. Gradual scepticism is accepted, while radical scepticism is punished by exclusion from the science community. In publicly debated cases over the past four months, falsification has been obstructed by the withholding of data required for duplicating the analysis.

In recent months, public trust in climate research has significantly eroded. For instance, SPIEGEL magazine questioned people as to whether they were personally fearful of climate change. In 2006, 62% agreed, while in 2010 only 42% agreed; in the US, Gallup asked people whether they believed the dangers of climate change were exaggerated; in 2006, 30% agreed, while in 2010 this figure had risen to 48%.

This erosion of trust is fundamentally based on a change of perception, since the key scientific messages about man-made climate change outlined above remain just as plausible as before. The problem is that these key messages have been complemented with more messages – for instance regarding the extinction of species or the number of heat-related deaths; these are interesting scientific hypotheses, but they are again and again used argumentatively as politically relevant facts. The exaggerations in the report made by the second IPCC working group can be named as relevant examples. These exaggerations, while minor in scale, contradicted the principle of sustainability in scientific practice. They made the representations by the IPCC look like a "bubble" which, in the eyes of the public, has now burst.

It is imperative that sustainability be restored; the most important element in this process is to restore the different functions of "politics" and "science". It is the task of politics to arrive at decisions which have comprehensible and normatively acceptable consequences; science, however, must explain interconnections, independent of normative systems. Politics must not hide behind would-be scientific necessities – such necessities do not exist in climate policy, just as the goal of reducing global warming to two degrees in relation to the pre-industrial status quo has little scientific grounding. Science must not be guided by the political usefulness of its statements. Politics and science may co-operate well as a team, but their roles and functions are completely different.

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