Science Advice

My name is Hans von Storch, a German scientist trained as mathematician, since 40 years in climate sciences, since 20 year a director of the institute of coastal research, since more than 20 years cooperating with social scientists, and since this year not only a member of the faculty of natural sciences but also of the social sciences at U of Hamburg. My main fields are statistical analysis, climate modelling, and the post normal science of climate.

At this time I am part of research teams at Helmholtz Zentrum Geesthacht, University of Hamburg and the Ocean University of China. I will retire form my task as director later this year.

When speaking about the dimension "science advice to public and policymaking", we should first note that this has very much to do with the cultural environment within which the problem perception and the role of science take place. What I am saying here refers to the western world.

Scientific knowledge represents a resource for the public, in making-sense of complex developments and perspectives, in decision making. Science is the process which generates this knowledge. It consists of best explanations given contemporary accepted understanding of dynamics, linkages etc. As such scientific knowledge is inherently provisional, and is considered valid until falsified.

Indeed, science is prepared to revise its understanding when new observations arrive, or if contradictions in the present understanding are unveiled. Failed attempts of falsification strengthen, while omitting such efforts weakens the validity of explanations. Attempting falsification is a necessary step to add plausibility of scientific knowledge.

The public acceptance of scientific knowledge as superior type of knowledge is the capital of science; by renouncing attempts of falsification, by failing to implement the scientific method (and norms a la Merton), by using the knowledge for the promotion of specific societal interests, this capital science is spent.

Scientists are social actors embedded in their cultural environment; they have values and preferences, some have well-meant agendas. They are lead by these preferences when choosing their field of interest and formulating their hypotheses, and when deciding if evidence is sufficient for accepting or rejecting their hypotheses. In their capacity as scientists, they are "Fachidioten", that is, they know their narrow field particularly well; their understanding of other fields, which are also of great importance for a societal problem, is as good as that of as any hairdresser, taxi-driver and journalist. Indeed they are biased as they often believe that their field is of particular significance.

Scientists are also normal citizens and thus entitled to take part in any public debate and public decision making. In doing so, they should not use the above mentioned capital of science as an argument supporting own preferences.

In *environmental sciences*, exploiting scientific understanding as key argument for specific decisions is common in recent decades, with the effect that the public is getting "resistant" to the cacophony of

newest scientific claims that this-or-that catastrophic development if this-and-that is not done. In effect this is the expected result of an unsustainable use of the capital of science.

For improving the relationship between science and policy, it is needed that *science is re-scientized* and *policy is re-politicized*. The specific characters of the two societal actors, science and policy, need to be determined and agreed upon - in a societal decision process. Science is supposed to provide best explanations of complex developments, independent if these explanations support one political preference on another. Policy, on the other hand, is supposed to take decisions, with all consequences for all aspects of the real world, which are acceptable for the public - in terms of values, preferences, and perceptions.

A good step forward would be if we could agree on a norm according to which scientists do not say "based on my science, policy must decide so-and-so" and policy makers do not say "I am deciding in this way because science tells me". What they should say is "the political decision option so-and-so will go with this-and-that in my field of competence" and "balancing the expected overall consequences with the values of my constituency, I favor option so-and-so".

I suggest that the scientific community is trying to follow a sustainable communication between science, public, and decision-makers. That is, that we consider our knowledge as a significant constraint for decision-making and not as the conclusive source for societal decisions. Our knowledge is informing decision-makers about the scientifically expected consequences of certain decisions for some components of the real world. Different scientific quarters provide constraints for different components of the real world. Eventually, however, political decisions are balancing societal preferences and values, and the role of science is and must be limited.