

In the flood of information and news, now another text from GCF? Yes – because our cell phones and computers keep flashing up with news about the coronavirus pandemic, the global economic and social disruptions it is triggering, and about the climate crisis lurking in the background. The result: information overload, calling for a calm effort to develop the understanding needed for reorientation in a world that has suddenly changed.

## I. Corona Shock

Coronavirus: invisible microscopic semi-living beings that in a few weeks spread suffering and death all over the planet. A global disaster unfolds, reported live in the media, and if you ask where it's happening the answer is: here – all over the world. If the Anthropocene is the epoch in which humankind realizes that we are shaping the planet on which we live, not only locally but globally, then the current coronavirus pandemic is the collective, physical and mental experience of the Anthropocene. And it is the experience that something is going deeply wrong in the coevolution of the species homo sapiens with its environment and all the other species populating it.

There is a temptation now to insist that the worst is over, that the pandemic will be gone in a year or two, and that the main task is to use the economic stimulus suddenly necessary so as to reduce greenhouse gas emissions. This is not what GCF should be doing. We have been among the first to advocate an investment oriented climate policy (more about this in the next section), and of course the investment flows required now should not reinforce structures that keep us on the trajectory of dangerous climate change.

In this situation, we - the GCF-community - would like to walk the path of connecting, of creating networks that look into the future, activating the scientific imagination as one of the indispensable resources if our common future is not to be one of fear, but of happily mending our planetary home.

But these investment flows need to pursue four goals in a synergetic way: They must reduce the suffering caused by the pandemic; enable health systems worldwide to treat the next, inevitable pandemics as bearable challenges; reduce the suffering caused by the present economic breakdown; and last not least facilitate the transition to a climate friendly world economy.

It is perhaps relevant to mention the plague known as The Black Death. It started in China in the mid-14<sup>th</sup> century and spread to India, Persia, Syria, and Egypt until it rapidly moved across Europe. Of all these places, in Europe the plague was an important factor bringing about the incredibly creative experience of the Renaissance (click: The Black Death and the Transformation of the West). Against this background, one may wonder how the coronavirus pandemic will enter the collective memory of humankind: as a disaster after which the coevolution of humankind and its environment continued right on track to the next calamity, or as a challenge and lesson followed by creative breakthroughs of human flourishing? At GCF, we prefer the latter.

## II. A European Green Deal?

Under its new president, Ursula von der Leyen, the European Union has officially embraced the vision of a European Green Deal. The vision is that Europe will achieve carbon neutrality in the next three decades, mobilizing an investment surge in the order of way more than 100 billion Euros per year. This vision is not presented as one of the many things the European Union will do in the coming decades, but as Europe's hallmark, as making Europe the first continent in the world to achieve carbon neutrality. Embracing the vision means that the deadlines and measures to realize it will become European law, and that this will be one of the first steps of the new Commission installed at the end of 2019.

Over the past years, GCF has engaged in research on an investment-oriented climate policy, starting with the publication, in 2011, of the report "A New Growth Path for Europe: Generating Prosperity and Jobs in the Low-Carbon Economy" (link [here](#)). This work is continuing to the present day, as shown e.g. at <https://green-win-project.eu/>. The main upshot of this research is that, to use Mario Draghi's words, the European economy is trapped in a bad equilibrium, and that by switching to a better equilibrium an investment-oriented climate policy can reduce emissions while increasing incomes and jobs in Europe. The European Green Deal has a strong emphasis on investment and is presented as a new growth strategy. This is a clear reinforcement for our research, and a reason to make the future development of the European Green Deal a major focus of this research. For the moment we notice that the recent GCF Working Paper "About the European Green Deal" ([here](#)) has already generated considerable interest. We will definitely build on it in the coming years.

That said, the European Green Deal as presently stated leaves room for improvement in three respects. First, until now the resources committed to increasing European investments while redirecting them towards a carbon neutral Europe are far from sufficient. Second, there still is no serious effort to create a European innovation system capable of the breakthrough innovations necessary for global carbon neutrality – achieving this goal must not become a luxury for rich nations. And third, in the face of the corona crisis it is urgent and important to broaden the image of the European Green Deal from a narrow focus on greenhouse gas emissions to the much more comprehensive task of moving towards a sustainable Europe – carbon neutral as well as capable to deal with pandemics and to avoid financial crises.

It is by no means clear that the European Green Deal will become a success story. Patient, careful research is needed to foster such an outcome, but also to learn from both successes and failures. Given the difficulties of the EU to get its act together in the face of the corona crisis, including its financial consequences, a big question mark is in order here – a question mark that is also an invitation for open-minded research.

### III. Decision Theater!

At GCF, some of us have developed a variant of the Decision Theater method mainly developed at Arizona State University. We call it the DT triangle (DT $\Delta$ ), because it combines three elements: mathematical modelling and simulation, socio-ecological (including economic) data and understanding, and a dialogue format letting practical experts and ordinary folks experiment with interactive models of a decision situation. A typical DT $\Delta$  event looks as follows: A group of three to thirty (possibly more) people comes together to discuss a decision problem. The participants may meet in any room with electricity and internet connection or in a video conference. In either case they share the view of two or more computer screens. The event lasts anything between three hours and a full day and is structured in three steps.

- In the first step, the participants get two briefings followed by short discussions. One briefing outlines the problem, including uncontroversial facts, tentative scenarios and open questions. The other briefing explains key assumptions and the structure of model they will be experimenting with. Key features are that the model is not deterministic and that decision-makers are understood and modeled as agents engaged in a coevolutionary social process. This is the direction in which our current modeling work is moving.
- In the second step, participants play with the model in groups not larger than about five. They discuss and decide which set of actions from a menu of possibilities they want to implement on tablet computers (or similar). It is important that they experience the need to take a decision in limited time with insufficient information.
- In the third step, the participants (if they had sub-groups, reassembled in a plenary) observe the consequences of their decisions as computed by the model and displayed on the shared screens. They then reflect on what lessons they want to draw from their choices and the resulting outcomes. They also discuss which features of the model they found useful as well as where and how they would want the model to be modified.

Of course, a group of participants can engage in a sequence of DT $\Delta$  events. Until now, we have run DTD events on policy choices for sustainable mobility, (documented e.g. *here*). Events ranged from a small group of civil servants from German ministries to a large group of students participating in a summer school, from attendees at a UN conference to a selected group of stakeholders interested in the topic.

The DT $\Delta$  method can be used in different ways, that can be combined. First, the method helps researchers to engage in the co-production of knowledge with stakeholders, making models more useful for actual problem solving, and improving model descriptions for the same purpose. Second, the method yields data on beliefs and norms entertained by different social groups, akin to data gained by focus groups in social research. Last not least, the method offers an innovative approach to science communication and decision support, enabling decision-makers to use simulation models not as crystal balls but as tools for responsible decision making.

The DT $\Delta$  method, like related Decision Theater approaches, answers to a historical shift in course at the science-society interface. Until recently, decision-makers relied on science in addressing situations where a unique, unambiguous description was sufficient to solve practical problems. Of course, many decisions were not of this kind, but then one relied on personal experience, tradition, and ad-hoc arguments rather than on findings by academic research. Meanwhile, however, decision-makers must increasingly deal with complex systems for which these resources are insufficient. At the same time, science (in the broad sense including the behavioural sciences and the humanities) is increasingly dealing with complex systems, too, and is thereby learning to use complementary descriptions without trying to reduce them to a unique, final truth.

## IV. Sea Level Rise

In GCF, work on sea level rise (SLR) is performed in the research process on “Adaptation and Social Learning” (ASL), led by IPCC Lead Author Jochen Hinkel. This work is acknowledged internationally as cutting-edge research in a challenging field. A key challenge is the deep uncertainty of climate change induced SLR, mainly due to a lack of understanding of how quickly the ice sheets of Greenland and Antarctica will melt with global warming.

The latest model-based assessment of the IPCC finds a 66% chance that global mean SLR will lie between 50 and 90cm until 2200 under a 2°C warming scenario. A recent expert elicitation, with similar assumptions and the same experts whose models contributed to the IPCC assessment, finds that global mean sea -levels will rise by 90-230 cm until 2200 (*Bamber et al., 2019*).

Many long-term decisions made today, such as on critical infrastructure, coastal protection and city planning, can be improved by keeping future options open and splitting decisions into multiple steps. For example, in Germany any coastal dike that is upgraded is equipped with a wider crest than necessary today, which allows further raise the dike if SLR turns out to be higher than originally anticipated. Key to finding economically optimal strategies is to consider not only current SLR scenarios (as usually done), but also scenarios of what will be known in the future, e.g. in 2050, about SLR beyond 2050. While this is practically never done, such information can be derived, because we know that we will have longer data records in the future. Having this information then allows to apply non-probabilistic variants of real-option analysis. ASL is pioneering this development together with leading SLR scientists from around the world (*Hinkel et al., 2019*).

In order to be effective, such theoretical considerations need to be combined with careful studies of local conditions and adaptation options. Different options thereby need to be considered in different contexts, e.g.:

- In river deltas, the most urgent response to climate-induced SLR is to reduce human-induced subsidence due to the abstraction of ground water, oil and gas. While in some cities like Tokyo this has been successfully stopped, the problem continues at alarming rates of 3 to 17 cm/year in places like Jakarta, Manila and Bangkok.
- For urban and densely populated coastal areas, building and upgrading infrastructures such as dikes and surge barriers will play a key role. Protecting densely populated coasts against 21st century SLR would require annual investments in the order of USD 10 to 100 billion. The benefits of protecting vastly outweigh the costs of not doing so, and the required annual investment is only a small fraction of local GDP (*Lincke and Hinkel, 2017*).
- For rural and sparsely populated coasts and for small island states, annual investments in coastal protection infrastructure would amount to several percent of local GDP. Promising alternatives include the use of ecosystem and sedimentary processes to adapt to SLR. In Bangladesh, e.g., low-lying areas are being raised through opening up embankments during floods so as to raise land surfaces through sediments deposited by the floods.

Such adaptation options look technically feasible in most contexts during 21st century SLR. If after 2100 SLR should reach several meters, massive retreat from the coast would result. Long before that, richer and more densely populated areas are likely to be well protected behind hard structures, while poorer and less densely populated areas will be unable to realize major investments in coastal protection (*Hinkel et al., 2018*). These issues are likely to be discussed extensively within future international climate change negotiations.

## V. A New Kind of Risks?

Modern societies have developed a highly effective approach to risk management, combining insurance markets with safety enhancing public regulations and investments. In particular, these societies have developed effective forms of health insurance over more than a century. Somewhat later, flood insurance joined the many branches of the insurance industry. Both with regards to health as well as flood risks, public policies have supported and complemented insurance mechanisms. The Netherlands is proof of how successful a modern nation can be in managing both health and flood risks.

Why then is the modern system of risk management not capable to deal with the risks of pandemics or with those of man-induced sea level rise in a similar way? Clearly, a major factor is the global character of these risks, leading to global coordination problems for which no adequate institutions exist. Presently, the main answer to these problems is the attempt to achieve some kind of global coordination based on nation states. Hard as this is, recent research (e.g. [link.springer.com/article/10.1007/s13753-018-0185-6](https://link.springer.com/article/10.1007/s13753-018-0185-6)), in which GCF plays an active role, points to an additional problem. The risks of pandemics as well as those of climate change (including sea-level rise) might be of a different kind than the conventional risks so successfully managed by many modern societies – conventional, that is, for these societies.

Conventional risks can be described by combining a utility (or disutility) function with a probability function indicating how likely different possible consequences of a given action are. This structure is common to the functioning of insurance markets and to the cost-benefit assessments made by public authorities.

But pandemics as well as climate change do not fit this kind of structure.

Trying to define utility functions runs into problems like those of translating every kind of suffering and damage – from people dying to coral reefs disappearing – into equivalents of global GDP. It can be done if enough researchers agree on some highly arbitrary procedure, but is of little help in bringing about effective action, especially at a global scale.

In a similar way, trying to define the mentioned probability functions runs into awkward problems, too. They include the fact that neither the possible actions nor their possible consequences are known in advance. Again, they may be defined somehow if enough researchers agree on some equally arbitrary procedure. But as experience shows this, too, is of limited help in bringing about effective actions, especially global ones. Here, we are not dealing with conventional, but with systemic risks.

So far, most research on systemic risks has been focused on the kind of financial risks displayed by the financial crisis of 2009. In the coming years, no doubt research on the systemic risks of pandemics will greatly expand. GCF is in an excellent position to compare research on systemic risks in the domain of pandemics and in the domain of finance with similar, although for sure not identical, systemic risks in the domain of sea level rise.

Our Decision Theater work and, related to it, our collaborations with Arizona State University, IASS in Potsdam and the Free University Berlin will be of great help in this part of our future research. But that's a topic for another cyber-bottle message.

## Postscript

This message has been written by Carlo Jaeger, chairman of the Global Climate Forum, with vital help from Christiane Völker, member of the GCF board. Based on earlier discussions in the board, we have taken this initiative now because we believe that the coronavirus pandemic calls for far-reaching learning in many quarters, including the broad arena of researchers, activists, decision makers, and other people who are focusing on climate change.

On the surface of things, in two or three years the world might look pretty much as it did before a new virus learned to inhabit human bodies connected by tightly coupled global flows of matter, energy, and information. But it would be a mistake to ignore the questions that this global experience raises with regard to the challenges of collective action humankind is faced with. Addressing those questions is not a matter of a few days or weeks. Therefore we wrote this text as an invitation for creative reflection, conversation, and research.

On top of the GCF homepage there is a link to this message; clicking on the link leads you to the space for comments of all sorts (we will keep trolls out by checking input before making it public). Comments from members as well as friends of GCF are more than welcome!

The GCF board will look into how the conversation unfolds there as well as in other settings (e.g. @carlojaeger operating on Twitter), and step by step look for ways to foster our joint learning in the near and not so near future.