Newsletter

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CzechGlobe

Global Change Research Centre CAS, v. v. i.

WAR HINDERS SOLUTIONS TO THE CLIMATE CRISIS

A well-known proverb says that it is never so bad that it can't get worse. It came true almost exactly two years after the spread of Covid, which suffocated the world for two years, and paradoxically at a time when it seemed like we might finally get out of the pandemic. The Russian military invasion of Ukraine began… We don't want to write about the war here, enough has been written about that. About the fact that, like all wars, it brings human suffering, casualties, a wave of refugees, immense economic damage. However, this war is specific in that it can also affect efforts to mitigate climate change and undermine the Green Deal. For the transition to a low-carbon economy and the replacement of fossil fuels and nuclear energy with renewable energy sources, some countries, led by Germany, bet on the production of energy from Russian gas, and this has proved to be a fundamental mistake from a geopolitical point of view. Uncertainty, reduced gas supplies and its astronomical prices, as well as calls for the toughest sanctions against Russia, including a complete cut-off from Russian gas and oil, could all slow down the Green Deal, if not jeopardize it. The question of the reopening of coal-fired power plants in Germany, Austria, Italy or the Netherlands and the likely extension of their operation has already come up. Belgium has again postponed the decommissioning of their nuclear power plants by 10 years, and the Czech Republic has postponed the ban of old solid fuel boilers of a lower emission class by two years. This is just a brief list of measures, which suggests that the current energy crisis may put the climate crisis solution on the back burner for a while. The coming winter will tell us more. Nevertheless it is already clear that Europe and the world are in for a tough time. Hand in hand with a lack of energy comes a lack of food. The price of gas and its restricted quantity limit the production and use of fertilizers, and thus lower yields are expected. All this at a time when Ukraine, one of the world's most important producers of wheat and sunflowers, was forced to reduce their production due to the war, and at the same time Russia is blocking exports of these commodities mainly to third world countries. The weather is also contributing to the looming food crisis. Since the beginning of the year, various parts of Europe, including the Czech Republic, have been facing drought. In June, an unusual heatwave in Western Europe reaching 40 °C added to

foto: Tomáš Vynikal

this, and farmers here are also beginning to count their losses. The real risk is that, in addition to war refugees from Ukraine, Europe will be flooded with refugees from Africa and Asia fleeing famine. In a short space of time, we could experience all the model situations that have so far appeared only in the most critical global change scenarios, and which we thought we would never experience, at least in Europe. We can only hope that the paraphrase of Zuzana Harmáčková's words in the interview inside the Newsletter will come true, that every scenario has a variant of good and bad development and it depends on us in which direction things will go. Perhaps the current crisis could end up being an accelerator of transformative change.

The current situation affects the whole society and CzechGlobe is no exception. Like all state and public institutions, we entered 2022 with a provisional budget, when the new government did not want to adopt a state budget with a planned high deficit, which was another consequence of the pandemic. Fortunately, the current government's cuts have had only a minimal immediate impact on science and research, which was unusual in earlier years of crisis. Even so, we have to tighten our belts, because, given the circumstances described above, practically everything is becoming considerably more expensive. However, apart from the rise in prices, it seems that life is finally going back to pre-pandemic business as usual. At the very beginning of the year, our colleagues were able to go on foreign missions in order to arrange new research cooperation in Ghana and Cuba. And two colleagues undertook a three-week research mission to Zambia. Unfortunately, however, due to low interest, we were unable to hold a major international conference planned for June. We were supposed to organize this conference on behalf of the newly formed consortium of European research infrastructure AnaEE-ERIC, which examines the complex impacts of global change on terrestrial and aquatic continental ecosystems in Europe. Perhaps here too the economic situation is the cause...

Finally, at least a little optimism – it is injected into our veins by the fact that this year we have already successfully managed to get 10 projects submitted in the first calls of the new HORIZON EUROPE programme. Hopefully we will continue to do well. -mš-

Meet one of us:

MGR. ZUZANA V. HARMÁČKOVÁ, PH.D.

Zuzana graduated from Ecology and Environmental Protection at Charles University in Prague. She received her doctorate degree in Environmental Studies from the same university. She researches scenarios of future development and socio-ecological resilience at the Global Change Research Institute of the CAS and at the Stockholm Resilience Center. She is engaged in creating and analyzing future scenarios and pathways to sustainability in cooperation with experts, politicians and members of the public across different cultural and geographical contexts (Europe, Central Asia, Africa). She coordinates the chapter on future development scenarios in the IPBES Nexus Assessment report and co-chairs the Ecosystem Services Partnership Steering Committee.

Last year, you became the recipient of the Otto Wichterle Prize awarded by the CAS to young scientists under 35. At CzechGlobe, which nominated you for the award, you deal with scenarios of socio-ecological development. Can you explain your work to us?

Future development scenarios show us the different ways society and the use of natural resources could evolve in the future and what impacts such development may have on the state of nature and the quality of human life. Scenarios are the subject of a field within sustainability science called futures studies.

We routinely think about the future in our private lives, but this does not happen very often on a society-wide scale. It turns out that as humans we are not very good at thinking collectively about the future, which includes society and nature. Research into future development scenarios therefore provides a number of techniques for thinking collectively about the future across different specializations and for identifying scenarios of development we'd better be prepared for. In addition, at a time when we are dealing with a range of sustainability issues (climate change, threats to biodiversity, global security situation, etc.), it is becoming increasingly clear that it is not possible to think of society and the natural environment separately because they interact. For example, with Bára Nohlová, we are now examining in Moravian Slovakia and Wallachia which landscape measures responding to climate change (e.g. green elements in the landscape) people consider fair and which they see as going against their interests and how this purely social dynamics affects the future of the landscape and natural conditions in it. The study of future development scenarios thus lies halfway between the natural and social sciences.

In practice, our work mostly consists of working with experts, politicians and representatives of the public or private sector and, using various techniques, we reveal with them what types of different futures could actually take place from their own point of view, what could lead to such futures and whether we see any rudiments of such development already. The information is then pieced together as a mosaic into descriptions of possible futures, which are further analyzed or, if necessary, their impacts are modeled. For me personally, it was very interesting to work on the scenarios we were developing as part of a project for the British public administration. The requirement was to find out how the various global developments would play out in the United Kingdom. The resulting scenarios are used by UK government agencies to develop strategies for the future. The subject of scenarios is close to my heart, because it seems to me that there is a lot of hope in it. "Scenario" thinking shows that at every moment in the world around us there are many rudiments of negative development, but also many rudiments of positive development. And that it is up to us to decide which ones we will help to grow.

As the coordinating lead author, you are currently involved in the assessment report of the UN Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES). How did you get involved in this platform, what does the work entail and what will be your specific contribution to the report?

I originally joined IPBES as an "Apprentice" (IPBES Fellow) in 2015, when work began on the Regional Assessment Report for Europe and Central Asia. It was very beneficial, both in terms of learning new things and in terms of meeting new colleagues from all over the world. If any of the PhD/postdocs students are interested, I highly recommend giving it a try. In addition, we are quite lucky that not too many people from "Eastern" Europe are applying, which is why it is a bit easier for us to get involved (one of the IPBES Fellows is currently a colleague Helena Duchková). It was experience that helped me establish a lot of cooperation over the years and also gradually led me, through other IPBES evaluation reports, to my current work in the evaluation report on the links between biodiversity and climate protection, food production, water protection and human health (the so-called "nexus"). In this report, I am coordinating a chapter on the possible future development of these linkages, which in practice means, over three years, together with other colleagues in the chapter, to research and evaluate the available scientific knowledge on the topic and to compile a synthesis that is accessible to policy makers, practitioners and the public. There are about twenty of us in the chapter, about 150 in the whole evaluation report, and so far it looks like a pretty nice cooperation.

There is a lot of talk today about transformative change, what does it mean?

The links ("nexus") between biodiversity and climate protection, food production, water protection and human health are important because they often negatively affect each other. For example with very intensive large-scale agriculture, we can produce a large amount of food in the short term, but it comes at the cost of greenhouse gas emissions, reducing biodiversity, reducing soil quality, disrupting the water cycle, etc. Understanding these contexts is one of the prerequisites for solving them. Another prerequisite is that appropriate action is taken, so science-policy platforms (such as IPBES) seek to contribute by connecting experts with political leaders and by facilitating the transfer of information and knowledge between them.

However, it is proving difficult to address the current sustainability challenges (climate change, biodiversity loss, or increasing inequalities in future decision-making) in a slow, incremental way. Adjusting the functioning of our society so that it is not "sawing off the branch it is sitting on" is currently either inefficient or too slow, or, for example, it may clash with the interests of large international

corporations. This is where the so-called research on 'transformation' or 'transformative change' enters the picture, looking at the possibilities for a deeper transformation of our society so that we can live better and at the same time change the direction of global crises (e.g. the climate crisis). Transformative change in society is the focus of another current IPBES evaluation report, where my colleague Julia Leventon is leading one of the chapters.

What do you think about the current situation and developments in connection with the war in Ukraine and the energy crisis? Is the Green Deal in danger? And in the context of the energy crisis and climate change, will people in the Czech Republic, for example, be ready and willing to move more quickly towards transformation?

From my point of view, the current situation shows how much we need to understand the social nature of the problems we live in and to take it seriously. Renewable energy sources are a good example. In a situation where our centralized energy system is facing crises associated with war and climate change, it would be quite logical to try to decentralize energy sources at least partially (e.g. many municipalities are already trying to find a way to at least partially become energy independent). In practice, however, we can see that the pressure of political interests and certain values embedded in society prevent the situation from being addressed with an eye to the future, and rather lead to solutions that count on preserving the past (e.g. re-strengthening coal mining). This shows how sometimes social dynamics prevail over the materiality of the solution, and this needs to be taken into account when looking for a solution. In this respect, I think it is good to look at the solutions that are being adopted in other countries and to take advantage of the technological and social innovations that work.

In terms of behavioral and lifestyle change in this respect, it shows, for example, that as humans we like to do things that we see in our environment. To illustrate: in countries where a critical mass of people have developed a preference for a diet with less meat, and where the supply of these foods in restaurants and shops has increased as a result, it turns out that the gradual "snowballing" of more people is much faster. Of course, the high economic cost of lifestyle changes is an obstacle in many cases, and it is therefore important to take into account the role of social and economic inequality as one of the barriers to sustainability. However, it is important to say that in many situations, lifestyle change can save money - cities may increase the proportion of cycling, car sharing, etc. In terms of food prices, it is possible to consider, for example, the amount of meat we eat. Overall, however, it is, of course, necessary to ensure that the transition to a more sustainable lifestyle is not only available to those who can afford it.

In the spring you were a member of an expedition to Zambia. What was the purpose and subject of your research?

The research in Zambia, which we are doing as part of a project of my colleague, Lenka Suchá, focuses on the links between social functioning and the sustainability of natural resource use and how understanding these links can be better used in the design of foreign development aid. This project is very close to my heart - firstly we have a great team of people, secondly we managed to establish a really effective cooperation with the organization People in Need. Thanks to this, we can continuously consult and adjust the focus of research so that it is easy to apply and its results are immediately usable for the Czech sector of foreign development cooperation. What also helps is that this is truly participatory research, with the active involvement of Czech experts from the foreign development cooperation sector.

The research trip to Zambia involved 20 days of intensive work, where we visited a number of respondents every day, recorded interviews, drew system maps of the links between social functioning and the use of natural resources, and organized focus groups. We have hours of audio recording and about twenty system maps from this trip. Transcribing and coding interviews, as well as the analysis of the system diagrams, are quite time-consuming, so we have a lot to do over the summer to be able to present the data to the Czech development in the autumn. The trip should be repeated next year, this time with the aim of looking for opportunities and barriers to more sustainable development in Zambia in the future and the role of Czech development in it. The project will result in a set of recommendations for planning and implementation of development projects.

LANŽHOT AND BÍLÝ KŘÍŽ STATIONS RECEIVED ICOS ERIC CERTIFICATION

From 17 to 18 May 2022, the 16th session of the General Assembly of the ICOS ERIC consortium, which manages the activities of the European research infrastructure ICOS (Integrated Carbon Observation System), took place in Villa Lanna in Prague. GCRI - CzechGlobe is one of its founding members.

In addition to the election of a new consortium president, who was unanimously elected Christian Plass-Dülmer, the German delegate of the Federal Ministry of Transport and Digital Infrastructure, an important item on the meeting agenda was the introduction of 13 greenhouse gas measuring stations which have recently obtained ICOS certification. Before that, they had undergone a very demanding procedure of standardization and quality control, which is a prerequisite for maintaining the quality of data and ensuring its usability in climate research. Among the newly certified stations there were two stations in the Czech Republic operated by CzechGlobe, namely the Bílý Kříž experimental site (Class 2 ecosystem station) and the Lanžhot ecosystem station (Class 1 ecosystem station) representing spruce forest and floodplain forest, respectively.

The uniqueness of the Lanžhot ecosystem station - the only Class 1 ecosystem station in the Czech Republic - lies in its location. It is a lowland floodplain forest, located on the border between wet and dry environments. In addition, due to human activity, the hydrological regime has changed, which may change the behavior of the entire forest. This gives scientists the opportunity to make general assumptions about how the floodplain ecosystem can behave in a changing climate. Such assumption is globally applicable to other floodplain forests in the world. The data obtained - the fluxes of most important greenhouse gases are measured, including carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4) - are also used to monitor the dynamic response of greenhouse gas production to water stress in this type of ecosystem.

TROPICAL TREE MORTALITY IS ACCELERATING

GOT OUR ATTENTION

One of the persistent uncertainties in the forecast of climate change (CC) development is the extent to which forest stands can absorb carbon dioxide. Forecasts of climate models, which are linked to carbon cycle feedback and terrestrial vegetation, are widely dispersed and vary. At one extreme, vegetation on the continents will become an increasingly important carbon sink (place of consumption) at least until the end of the century, another extreme suggests a possible weakening of the sink by up to half in the next twenty years. A new study published in the journal *Nature* provides yet another in a growing body of evidence of a gradual weakening of tropical forests' ability to absorb CO_2.

Forests in general, but tropical forests in particular, are often mistaken for the "lungs" of the planet. However, the real benefits of tropical forests lie elsewhere, in their huge biodiversity and in the fact that they are a large reservoir of carbon in the form of aboveground biomass, which has persisted here for thousands of years with minimal human influence. By stimulating photosynthesis through increasing concentrations of CO_2 in the atmosphere, tropical forests also act as a sink for some of this excess carbon. An international team of scientists led by David Bauman of the Smithsonian Environmental Research Center in the United States studied the growth dynamics of humid tropical forests in Australia at 24 sites over a 49-year long period. The results showed that at all sites, which covered a wide range of humid tropical climates, mortality increased. On average, tree mortality has doubled in the last 35 years. This means that the loss of biomass in forests has increased by 12% since the 1970s. One consequence of this trend is the potential halving of carbon sequestration in forest ecosystems. The mortality rate varied between localities, however, it was higher in drier areas, where the stands approached the limit of their tolerance to the water deficit. According to the authors, the trend of a systematic increase in tree mortality in the tropical regions of Australia is due to an increase in temperature and the associated increase in moisture deficit. The paper has produced one of the longest and most detailed descriptions of mortality in tropical areas to date, and scientists find its results disturbing. Should the trend of increasing mortality continue or even accelerate, it is only a matter of time before vegetation becomes a source of CO_2 instead of a sink. Although the study only looked at long-lived natural vegetation in Australia, similar results are likely to be expected in other tropical areas with similar conditions. A similar trend of increasing tree mortality has been observed in previous studies conducted in the natural forests of North America.-aa-

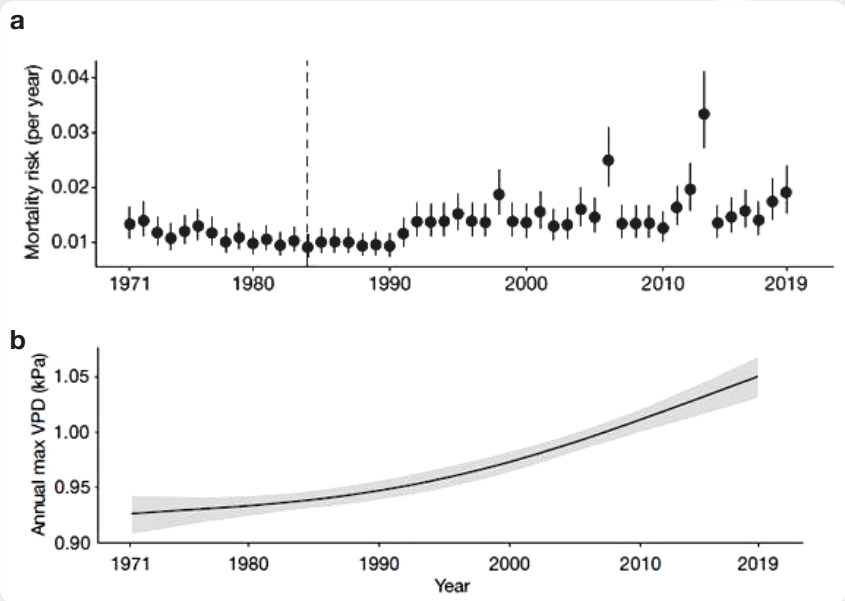

Fig. 1: *Development of tree mortality risk at 24 locations in Australia (a) and development of maximum annual moisture deficit (b). (Bauman et al., 2022).*

References:
Bauman D.et al. 2022, Nature: https://www.nature.com/articles/s41586-022-04737-7

WHAT´S NEW

Meeting of Intersucho and Agrorisk applications' associates

On March 31, 2022, a meeting of associates of the Intersucho and Agrorisk application teams took place in Větrný Jeníkov. Reporters and users of the Intersucho application and representatives of agricultural organizations were introduced to the news from both websites and learned about the use of information from the Agrorisk application for plant protection and optimization of agrotechnics. The current state of drought was also an important topic. The spring drought plagued the whole of Europe, which is already under the influence of an anomaly involving the war in Ukraine, one of the world's largest wheat producers, and the echoes of the covid pandemic threatened by insufficient food availability. The current situation thus shows that a change in agricultural management throughout the EU is needed to avoid food poverty.

Science fair

From 2 to 4 June, 2022, another year of the Science Fair took place at the exhibition center in Letňany, Prague. This year, CzechGlobe was represented by the Dept. of Ecosystem Functional Analysis of the Landscape with its exposition called "How does the landscape work?". Practically presented research methods showed the connections between the use of agricultural land and the ecological status of water bodies, as well as the impact of selected nature-friendly measures mitigating the effects of climate change (CC).

Research, development and innovation for climate change in the Czech Republic conference

On June 23, 2022, the Office of the Government of the Czech Republic together with the R&D&I Council, the Ministry of the Environment and the CAS organized a conference entitled "Research, development and innovation for climate change in the Czech Republic" in the Liechtenstein Palace in Prague. CzechGlobe played an important role in the event that was intended for the representatives of the public and application spheres and research institutions. Prof. Trnka and prof. Marek gave keynote speeches on CC and the transfer of basic research results into practice. Prof. Trnka and prof. Žalud were also the main panelists in the discussion.

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