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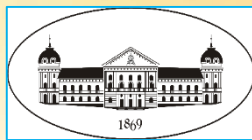
IIth Danube Academies Conference 22 October 2021

Organised by:



Bulgarian Academy of Sciences

European Academy of Sciences and Arts

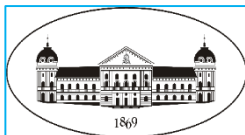


Sofia, Bulgaria

IIth Danube Academies Conference

22 October 2021

----- online via zoom -----



Programme and Abstracts

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ISBN: 978-619-245-164-6

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CONFERENCE OVERVIEW

The Danube Academies Conference (DAC) is a platform for exchange between the national academies from Central and Eastern Europe. It has been established by European Academy of Sciences and Arts in order to gather scientific and research capacities from this part of Europe. The idea goes back to 2010 and was initiated by the launched European Strategy for the Danube Region. The European Academy of Sciences and Arts organised the first Danube Academies Conference in Vienna in 2011. Recently, the DAC brings together all national Academies of the Danube Region and focuses on the scientific developments of this area. This year the 11th Danube Academies Conference is hosted by the Bulgarian Academy of Sciences under the scientific topic “Climate Change and Climate Control”.

Recently, the world is experiencing changes in average temperature, shifts in the seasons and an increasing frequency and severity of extreme weather events and climate change impacts. Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years (IPCC 2020). As a result, widespread and rapid changes in the atmosphere, hydrosphere and biosphere have occurred. Human-caused climate change is accelerating the degradation of aquatic ecosystems and the services they provide. Climate change is one of the five major threats to biodiversity globally (CBD 2006). Furthermore, it can increase the effects of other threats, e.g. climate change can accelerate the introduction and spread of invasive alien species.

The importance of adaptation to climate change has been increasingly recognised globally. Adaptation aims to manage climate risk to an acceptable level, taking advantage of any positive opportunities that may arise. The new EU Strategy on Adaptation to Climate Change (2021) sets out the pathway how the European Union can adapt to the unavoidable impacts of climate change and become climate resilient by 2050. The Strategy has four principle objectives: to make adaptation smarter, swifter and more systemic, and to step up international action for climate resilience. The recent EU documents on Green Deal, Biodiversity 2030 Strategy and the Farm to Fork Strategy present a complex set of initiatives to restore and integrate biodiversity into our lives, aiming, among others, to reduce the CO₂ emissions and become climate neutral by 2050.

The EU Strategy for the Danube Region (EUSDR 2010) and the revised Action Plan (2020) address climate change impacts on extreme weather events (floods, drought, forest fires, storms, erosion, icing, and water scarcity), hydrological cycles, precipitation patterns and water level variations, which affect water management throughout the Danube River Basin in manifold ways. Among the 11 priority areas (PA) of the EUSDR, climate change impacts and climate adaptation issues prominently feature in Pillar 2 ‘Protecting the environment’ (PAs 4, 5 and 6), and in addition, climate change has been included as horizontal topic, which successful implementation calls for a strong collaboration between the relevant PAs.

The Danube River Protection Convention (DRPC) addresses climate change in an indirect way by aiming at the conservation, improvement and rational use of surface waters and groundwater as well as at preventive measures to control hazards originating from accidents involving floods. The International Commission for the Protection of the Danube River (ICPDR) adopted a Strategy on Adaption to Climate Change for the Danube River Basin, updated in 2018. It provides the knowledge base and a strategic framework for integrating adaptation of the water sector to climate change into the implementation of the EU Water Framework Directive and the EU Floods Directive.

Scientists have crucial role in climate impact, risk and vulnerability assessments, which are used: (i) to identify the nature and magnitude of these impacts for natural systems and human society; (ii) to identify the regions, sectors or system components affected; (iii) to plan and implement adaptation measures; and (iv) to prioritise resources. Furthermore, scientific-based socio-economic and climate scenarios are developed, providing plausible descriptions of possible future states based on the choices made by society. And finally, scientists contribute to the development of various innovative adaptation solutions, which enable better management of the risks of climate change, and their incorporation into planning, policy and practice on the global, regional and national scale.

The Bulgarian Academy of Sciences (BAS) has been actively involved in the climate change and adaptation research, innovation, technology development and education under several major research divisions: ‘Climate change, hazards and natural resources’, ‘Biodiversity, bioresources and ecology’, ‘Energy resources and energy efficiency’, ‘Nanosciences, new materials and technologies’, and ‘Information and communication sciences and technologies’. BAS has further extended these activities by leading and participating in regional and international projects and networks, such as LTER, IAD, DIAS, ESENIAS, GLORIA, and many others.

The 11th Danube Academies Conference is organised by the Bulgarian Academy of Sciences and the European Academy of Sciences and Arts. The Conference focuses on topics related to climate change and science-based solutions for adaptation and aims at:

- ✓ Presentation of research results from current project activities relevant to the topics;
- ✓ Sharing of information about initiatives and innovative solutions related to climate change impact and adaptation carried out in the Danube Region, such as national and regional programmes and strategies, networks, new technologies, conservation and restoration activities, etc.; and
- ✓ Networking and cooperation among scientists of national Academies of the Danube Region and other research organisations and networks.

Editorial Team

PROGRAMME

- 10.00 – 10.30** **Opening of the Conference**
- 10.00 – 10.20** Address of Prof. **Julian Revalski**, *President of BAS*
Address of Prof. **Konstantin Hadjiivanov**, *Deputy Minister of Education and Science*
Address of Prof. **Klaus Mainzer**, *President of EASA*
Address of Prof. **Felix Unger**, *Honorary President of EASA*
- 10.20 – 10.30** Address of Mr. **Florian Ballnus**, *Priority Area 6 Coordinator – EU Strategy for the Danube Region*
- 10.30 – 10.50** Ludvik Toplak, *Alma Mater Europaea* – **Digital Education as a Precondition for Green Europe**
- 10.50 – 11.10** Kristin Davidse, Anne-Marie Simon-Vandenbergen and Wout Van Praet, *Royal Flemish Academy of Belgium for Sciences and the Arts* – **Climate Communication between Flemish Politicians and Citizens on Facebook**
- 11.10 – 11.30** Pavol Miklanek, *Slovak Academy of Sciences* – **Programme and Projects of the Danube Countries Cooperation within the Intergovernmental Hydrological Programme of UNESCO**
- 11.30 – 11.45** Round Table – **Convener:** Kostadin Ganev
- 11.45 – 12.00** **Coffee Break**
- 12.00 – 12.20** Dimitar A. Panayotov and Konstantin I. Hadjiivanov, *Bulgarian Academy of Sciences* – **The Potential of CCS (Carbon Capture and Storage) and CCU (Carbon Capture and Utilisation) as Climate Mitigation Technologies**

- 12.20 – 12.40** Hristo Chervenkov, Georgi Gadzhev, Vladimir Ivanov, Kostadin Ganev and Ivelina Georgieva, *NIMH and Bulgarian Academy of Sciences* – **Computer Simulations of Future Climate for South-Eastern Europe and Bulgaria**
- 12.40 – 13.00** Bernd Cyffka, *CU Eichstaett-Ingolstadt/ Floodplain Institute, Germany* – **The Importance of Floodplain Restoration for Mitigating the Impacts of Climate Change along the Danube**
- 13.00 – 13.20** Katrin Teubner, Andras Abonyi, Doru Bănăduc, Angela Curtean-Bănăduc, Norbert Exler, Georg Janauer, Hristina Kalcheva, Artem Liashenko and Mateja Germ, *International Association for Danube Research* – **Climate Response in the DRB: a Brief Overview from the Perspective of IAD**
- 13.20 – 13.35** Round Table – **Convener:** Ekaterina Batchvarova
- 13.35 – 13.50** **Coffee Break**
- 13.50 – 14.10** Cristina Sandu, Thomas Hein, Bernd Cyffka, Juerg Bloesch and Georg Janauer, *IAD, International Association for Danube Research* – **65 years of Aquatic Research and Cooperation in the Danube River Basin**
- 14.10 – 14.30** Thomas Friedrich, Jakob Neuburg and Paul Meulenbroek, *University of Natural Resources and Life Sciences, Institute for Hydrobiology and Aquatic Ecosystem Management, Austria* – **A LIFE for the Sturgeons – MEASURES Needed for the Preservation of the Danube’s Living Fossils**

- 14.30 – 14.50** Teodora Trichkova, *Bulgarian Academy of Sciences* –
**Invasive Alien Species in the Danube Region: Networking
and Strategy Development**
- 14.50 – 15.10** Kremena Stefanova, Snezhana Moncheva, Violeta Slabakova,
Ivelina Zlateva, Nadezhda Valcheva, Elitsa Stefanova, Natalia
Slabakova, Nina Dzhembekova, Valentina Doncheva,
Ognyana Hristova, Boryana Dzhurova & Radka Mavrodieva,
Bulgarian Academy of Sciences – **Pelagic Ecosystem
Response to Climate Change in the North-Western Black
Sea**
- 15.10 – 15.25** Round Table – **Convener:** Teodora Trichkova
- 15.25 – 15.35** Closing remarks

NB: Time is expressed in Eastern European Summer Time.

Digital Education as a Precondition for Green Europe

Toplak, Ludvik

Alma Mater Europaea – European Centre Maribor, Slovenia

Climate change and climate control is a crucial challenge of our time. The European Academy of Sciences and Arts, addressing the current challenges of the Danube Region and border regions, can make a very tangible contribution to the digitalisation of green Europe and sustainable development.

For this reason, this presentation is focused on the issue of “REgional Digital Educational Network” for open digital education and green sustainable development (REDEN).

Digitalisation can substitute many human activities, especially in industry, transport, energy, and other sectors of the economy. For this purpose, however, we need new skills, pedagogical methods, and technologies in the Covid and post-Covid era.

Following the European directions, such as the European Digital Transformation and the European Green Deal, we propose a network of educational, technological, and business partners within the Danubie Region.

REDEN develops and promotes content, methodology, applications and educates about using new digital tools in education on all levels in the enlarged Danube Region. In cooperation with local high-tech partners in the region and globally, it offers and develops qualitative and competitive tools and equipment for open education in digital transformation and sustainable development respecting national cultural identities and the appeal of climate change and climate control.

Climate Communication between Flemish Politicians and Citizens on Facebook

Davidse, Kristin¹, Vandenberghe, Anne-Marie², and Van Praet, Wout¹

¹*KU Leuven*, ²*Ghent University*, ° *KVAB (Royal Flemish Academy of Belgium for Sciences and the Arts)*

In Belgium, there are no political parties or (mainstream) media outlets that challenge the consensus that climate change is real and requires strong action. Important political disagreements, however, still exist (e.g. about the choice of technologies such as nuclear energy, the urgency and timing of implementations of policy instruments) (Pepermans & Maesele 2017). These disagreements are potentially exacerbated by new forms of soft denial, which slow down climate action, for instance by questioning the impact of solar panels or by advancing miracle solutions like geo-engineering (Boussemaere 2021).

The aim of the study is to expose (dominant or non-dominant) discourses in the Flemish climate debate that potentially undermine effective climate action. The study focuses specifically on the language Flemish political parties use to communicate about climate change on Facebook and how audiences react to these Facebook posts. Two questions will be addressed: (i) which ideological positions on climate change are established through the language use in climate posts and comments (e.g. through word choices, topic choices, presuppositions); (ii) how can expressions of praise or criticism in climate post comments feed back into more effective and constructive climate communication by influential stakeholders such as experts, politicians, government officials. Ultimately, this will allow us to counter harmful discourses with positive alternatives.

References

- Pepermans, Yves & Pieter Maesele. 2017. Climate communication in Belgium. Oxford Research Encyclopedia of Climate Science. Oxford: Oxford University Press.
- Boussemaere, Pieter. 2021. De nieuwe vorm van klimaatontkenning: afleiden, verdelen, bagatelliseren. De Standaard, 7 April 2021. https://www.standaard.be/cnt/dmf20210406_97764142

Programme and Projects of the Danube Countries Cooperation within the Intergovernmental Hydrological Programme of UNESCO

Miklanek, Pavol

Institute of Hydrology, Slovak Academy of Sciences

The Intergovernmental Hydrological Programme is UNESCO's international scientific cooperative programme in water research, water resources management, education and capacity-building, and the only broadly-based science programme of the United Nations system in this area. In 1971, the hydrologists of the 8 Danube countries launched, on a voluntary basis, a regional hydrological cooperation aiming to produce consistent hydrological information about the whole Danube catchment. Since 1987, this cooperation has been carried out in the framework of the International Hydrological Programme of UNESCO, renamed as Intergovernmental Hydrological Programme in 2018. The presentation briefly describes the history of the cooperation, focusing on its results: the Hydrological Monograph of the Danube River and its Catchment (1986), as well as on its so far issued 13 thematic follow-up volumes. The monograph "Flood regime of rivers in the Danube River Basin" was published at the Institute of Hydrology SAS in 2019. This monograph is the result of long-term cooperation of a wide range of hydrologists from 11 countries in the Danube Basin. The main topic of the recent phase is the low flows and draught on basin-wide scale attracting specialists from all Danube countries. The cooperation provides a sound and consistent information basis for integrated water management.

The Potential of CCS (carbon capture and storage) and CCU – (carbon capture and utilisation) as Climate Mitigation Technologies

Panayotov, Dimitar A. and Hadjiivanov, Konstantin I.

Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, Acad. G. Bonchev Street, Bl. 11, Sofia, Bulgaria

The anthropogenic greenhouse gas emissions emitted into the atmosphere from various sources (power generation, industries, transportation, oil fields, and others) are the principal cause of climate change. Combating climate change has been the main goal of governments across the world. Electricity generation and industrial processes using fossil fuels can be integrated with carbon capture, utilisation, and storage (CCUS) technologies to reduce their environmental impact. CCUS involves a suite of technologies to capture CO₂ emissions from point sources such as industrial emissions or sucked out directly from the atmosphere, and they can be stored underground (carbon capture and storage (CCS)) or used (carbon capture and utilisation (CCU)). The transition to widespread deployment of CCS continues to be a particular challenge as its financing requires the combination of strong policy and price signals to ensure that low-carbon investments offer a sufficiently attractive risk-adjusted return. Although the CCU technologies can provide a wide variety of valuable end products, in addition to its potential for enhanced hydrocarbon recovery, the perspective for its contribution to climate mitigation is rather limited. Here we present some important milestones for CCS and CCU, their current status across the world and the key opportunities and challenges they face.

Computer Simulations of Future Climate for South-Eastern Europe and Bulgaria

Chervenkov, Hristo¹, Gadzhev, Georgi², Ivanov, Vladimir², Ganev, Kostadin² and Georgieva, Ivelina²

¹National Institute of Meteorology and Hydrology, Bulgaria

²National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences

Nowadays there is a strong degree of agreement that climate change is the defining challenge of our time. The analysis based on climate indices is probably the most widely used non-parametric approach for quantification extreme climate events. This presentation which shows some recent results of this scientific group, is dedicated on the assessment of the spatial patterns and the temporal evolution of key temperature- and precipitation-based indices in projected future climate over south-east Europe up to the end of the century. The annual means of the daily mean and extreme temperatures are also analysed in consistent manner. The indices are computed from the bias-corrected output of 5 CMIP5 global models, forced with all 4 RCP emission scenarios. The multi model ensemble medians of the temperature-based indices shows considerable warming which is consistent with the increase of the mean temperatures and is statistically significant in most cases. The revealed changes of the precipitation-based indices are more complex when compared with temperature changes.

The Importance of Floodplain Restoration for Mitigating the Impacts of Climate Change along the Danube

Cyffka, Bernd

CU Eichstaett-Ingolstadt/ Floodplain Institute, Germany

Worldwide floodplains are diverse and sensitive areas, not only from the biodiversity point of view. Their most important ecosystem functions are carbon sequestration, nutrient storage, habitat provisioning, and climate regulation as well as flood retention. All these functions serve also as ecosystem services, and therefore they are contributing to human well-being. In Europe and especially in the Danube River catchment we are facing a huge loss of natural floodplain areas. That means that these functions and services are deteriorated, partly lost, because we straightened and embanked our rivers, set up long and high flood dikes, and thereby separated rivers and floodplains. Sometimes this leads also to a deep incision of the riverbed, so that even minor floods cannot reach the floodplain. In general, very often there is a lack of natural dynamics. However, we need these dynamics and the affected areas to be prepared for the effects of climate change. Against this background, it is absolutely necessary to restore and remediate the lost or partly lost floodplains, and to preserve that areas which still have their functions. The presentation will show measures which can help to overcome the situation – at least to a certain extent.

Climate Response in the Danube River Basin: a Brief Overview From the Perspective of IAD

Teubner, Katrin¹, Abonyi, Andras², Bănăduc, Doru³, Curtean-Bănăduc, Angela³, Exler, Norbert⁴, Janauer, Georg¹, Kalcheva, Hristina⁵, Liashenko, Artem⁶, and Germ, Mateja⁷

¹ *Department of Functional and Evolutionary Ecology, University of Vienna, Vienna, Austria*

² *Institute of Aquatic Ecology, Centre for Ecological Research, Budapest, Hungary/WasserCluster Lunz, Austria*

³ *Applied Ecology Research Center, Lucian Blaga University of Sibiu, Sibiu, RO-550012, Romania*

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⁵ *Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences (IBER-BAS), 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria*

⁶ *Department of Ichthyology and Hydrobiology of River Systems, Institute of Hydrobiology of the National Academy of Sciences of Ukraine, Kyiv, Ukraine*

⁷ *University of Ljubljana, Biotechnical Faculty, Jamnikarjeva 101, 1000 Ljubljana, Slovenia*

Climate research goes far beyond temperature trends issued in applied meteorology, and it was broadened up early to an ecosystem perspective when the first IPCC report was released in 1990. At that time, many publications in the Danube River Basin stating on climate change were mainly written in national languages. National researcher consortia focused on the potential impact on nature (ecosystems and ecosystem services), and gave early management recommendations to balance against or to cope with consequences of warming. Although IAD, founded in 1956, mainly focused on habitat and nature conservation in a broad sense (including biodiversity, invasive species), there was increasing awareness about the impact of global warming superimposing deteriorations by other anthropogenic effects in research papers along the whole Danube River. Climate response for the Danube River or other freshwaters in the Danube countries are outlined by four main aspects: (1) how to identify the impact of climate change on freshwaters, (2) why methods identifying an ecosystem response to climate change are different from methods commonly applied in ecology, (3) how to tackle which data suits most for climate research and (4) what we have learned from climate research for better understanding of ecosystems.

International Association for Danube Research – 65 years of Aquatic Research and Cooperation in the Danube River Basin

Sandu, Cristina, Hein, Thomas, Cyffka, Bernd, Bloesch, Juerg and Janauer,
Georg

International Association for Danube Research (IAD)

Established in 1956 with the aim to foster limnological research in the Danube River Basin, IAD has provided a platform for cooperation and scientific exchange for aquatic research teams from Western and Eastern European countries. The research topics have evolved over time from hydrological, physical, chemical and biological assessments, to more integrated and complex subjects such as anthropogenic impacts (e.g. climate change, decline of freshwater biodiversity), ecosystem services and integrated management. In 1960/1961, the first joint Danube surveys were organised by IAD, followed by a long series of research studies and publications about the Danube River. After the establishment of the International Commission for the Protection of the Danube River (ICPDR) in 1998 as governmental body for water management in the Danube River Basin, IAD, as one of the first observers, provided constant scientific input on topics such as hydromorphology, sturgeon conservation, microbiological water quality, invasive alien species, and supported the four Joint Danube Surveys organised by ICPDR. In recent years, IAD became more involved in disseminating scientific results to the policy level, nature conservation activities and environmental education. Danube News, the IAD bi-annual bulletin, presents briefly the key scientific activities/ projects carried out in aquatic ecosystems of the Danube River Basin (www.danube-iad.eu).

A LIFE for the Sturgeons – MEASURES Needed for the Preservation of the Danube’s Living Fossils

Friedrich, Thomas, Neuburg, Jakob and Meulenbroek, Paul

University of Natural Resources and LIFE Sciences, Institute for Hydrobiology and Aquatic Ecosystem management, Austria

Sturgeon conservation in the Danube requires a multi-angle approach including above all ex situ conservation, in situ protection and habitat restoration and sound monitoring of populations. Over five years the LIFE-Sterlet project implemented novel methods for incubation and rearing of sturgeons in unpurified Danube water in order to release imprinted fish, fit to survive in the wild. Accompanied by hydroacoustic tracking and capture-recapture surveys habitat use and population development is monitored. Within INTERREG-MEASURES an eDNA approach was applied and adapted for the first time in order to timely detect locations which can then be subject to population monitoring in the future.

Invasive Alien Species in the Danube Region: Networking and Strategy Development

Trichkova, Teodora

Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Sofia, Bulgaria; International Association of Danube Research (IAD); Danube Region Invasive Alien Species Network (DIAS)

The introduction and spread of invasive alien species (IAS) in Europe have been accelerated recently due to human activities and climate change. As a result, the biodiversity and ecosystems in different regions, including the Danube Region, are affected severely, and adverse socio-economic impact and impact on human health has been reported. The Danube Region Invasive Alien Species Network (DIAS) was established in 2014 within the frame of Priority Area 06 of the EU Strategy for the Danube Region to meet the necessity of cooperation and coordinated actions related to IAS between scientists, authorities and stakeholders at regional level. The main focus of DIAS has been the development and implementation of the IAS Strategy for the Danube Region and work plan. The Strategy provides goals and objectives, possible measures and recommendations, and defines relevant actors on seven key topics: 1) IAS – species and interactions/ impact in the Danube River Basin; 2) Pathways of introduction and spread; 3) Information system and knowledge dissemination; 4) Risk assessment and prioritisation; 5) Early detection and rapid eradication; 6) Management of established IAS and restoration; and 7) Awareness raising, communication and policy regarding IAS. The presentation addresses current DIAS activities and the updated IAS Strategy.

Pelagic Ecosystem Response to Climate Projections in the North-Western Black Sea

Stefanova, Kremena, Moncheva, Snezhana, Slabakova, Violeta, Zlateva, Ivelina, Valcheva, Nadezhda, Stefanova, Elitsa, Slabakova, Natalia, Dzhebekova, Nina, Doncheva, Valentina, Hristova, Ogniana, Dzhurova, Boryana and Mavrodieva Radka

Institute of Oceanology, Bulgarian Academy of Sciences, Varna, Bulgaria

Black Sea is considered among the marine areas that could be most affected by climate change. Climate change projections in the area include scenarios resulting in relatively large temperature increase, a decrease in precipitation and an increase in frequency and intensity of severe droughts, heatwaves followed by extreme rainfalls and storm events. Climate also influences salinity (by evaporation or precipitation), oxygen concentration (by water mixing), macronutrients (by upwelling and river discharge), micronutrients (through the influence of atmospheric circulation), and pH (influenced seasonally by photosynthesis). Marine pelagic systems are strongly affected by the impact of climate including decreased productivity and a shift from autotrophic to heterotrophic dominance. The study addresses the phyto- and zooplankton communities' response to climate projections in the North-Western Black Sea. Both the direct and indirect effects of environmental change are considered to understand the complex ways in which climate change is likely to alter plankton communities. Different types of expected responses, from local to regional adjustments, and from species to community levels are reviewed based on long term monitoring phytoplankton and zooplankton data (2000–2020).

