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In collaboration with:

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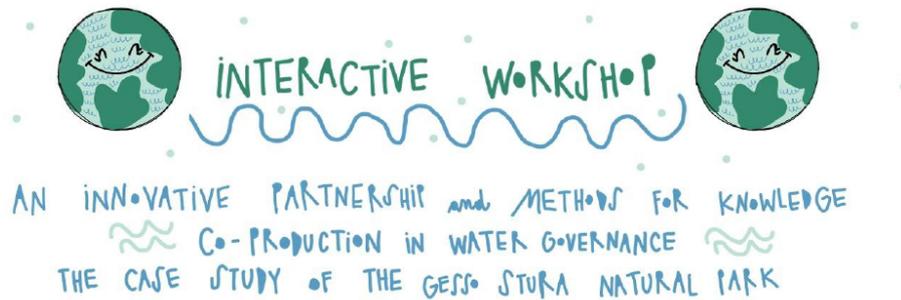
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Dialogue with South Europe 2023/Hochschuldialog mit Südeuropa 2023



April 17-19, 2023

Project coordinator:

University of Bayreuth, Faculty of Law, Business and Economics, Prof. Dr. Eva Lohse

Project partner:

University of Turin, Department of Management, Prof. Dr. Margherita Paola Poto

With the participation of:

the Secondary School pupils of the Istituto Comprensivo di Medicina (Bologna)

Supporting institutions and networks:



Figure 1 The poster of the event co-created by Valentina Russo and Margherita Poto

Summary

This report describes the education, research activities and productive dialogue that took place over a 3-day workshop at the Gesso Stura Natural Park (Italy, Piedmont Region). The project was coordinated by Prof. Eva Julia Lohse in collaboration with Prof. Margherita Paola Poto, and funded by the DAAD to establish and strengthen collaboration between the University of Bayreuth and the University of Turin. The workshop aimed to explore interdisciplinary, novel methods for (legal and political) water governance in the age of climate crisis. It investigated how co-production of knowledge can be used in environmental decision-making processes so as to reach better decisions based on a broader knowledge base, increase acceptance of protection measures by the public, and improve management of areas hit by severe droughts to guarantee access to water for communities. The workshop builds on the long-standing cooperation between the two principal researchers and their institutions regarding participation in environmental decision-making, sustainable development and water governance in Italy and Germany. This cooperation has been further developed by joint research on co-production of knowledge with indigenous and local communities to address the complex legal and social questions raised by the climate crisis.

The workshop involved researchers in the field of administrative, environmental and indigenous law, scientists from marine geology and hydrology (Turin), as well as geoecology (Bayreuth), political scientists and experts in eco-tourism. Further, the workshop included persons actively involved in decision-making and governance at the Natural Park. Due to the diversity of actors involved in the field of water governance, the research group activities were developed as an interactive workshop (IW) for professional training on strategic knowledge sharing. The IW also involved community members (representatives of the Gesso Stura Natural Park), an illustrator and a videographer, as well as teachers and school pupils from the second class of the Scuola Secondaria di I grado, Istituto Comprensivo di Medicina (Bologna, Italy: one class of 24 pupils and three teachers). The idea was to have all IW participants cooperate (researchers, members of the community and the active committee of the Natural Park, class from the Scuola Secondaria, Medicina, Bologna) to develop a scientific framework for co-production of knowledge in water governance and establish best practices. The workshop took place in the Gesso Stura Natural Park, as it has been affected by severe droughts due to climate change. The Natural Park has an active committee that organizes numerous activities connected to water protection, including a multisensory activity, which closely aligns with the research previously conducted by the project partners at the University of Turin.

Experiences with water governance in Northern Bavaria (Franconia), which has also been hit by long-lasting aridity, and the corresponding research on participatory measures at the University of Bayreuth were included in a comparative case study during the workshop. Going forward, the findings of the comparative case-studies and discussions will be used to 1) cooperatively develop learning materials for public decision-makers, committees, NGOs and pupils on co-production of knowledge in water governance and 2) to co-author a scientific publication, published with the Berliner Wissenschaftsverlag.

This report is accordingly divided into the following sections: 1. Aim of the workshop and content; 2. Participants and contributions; 3. Ways forward and next event.

Acknowledgments

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Figure 2. The Gesso Stura Natural Park. Photo credit: Alessandro Cerato

Aim of the workshop and content

Our 3-day-workshop was designed to co-create a common framework for co-production of knowledge (CoPK) through the mapping and evaluation of existing climate-smart water governance practices. By using an inductive and comparative approach, we explored how state and non-state actors can systematically and effectively develop ways of CoPK in order to take into account the perspectives of different knowledge bearers. Ultimately, we came to a consensus that CoPK can successfully counter the perceived lack of effectiveness of the decidedly uni-lateral participatory rules in administrative and international decision-making. The workshop connected the narrative of effective participation with the best practices of CoPK from selected local communities.

The team

The Co-Production of Knowledge Network (hereinafter: Coproknet) is a research-action network founded in 2021 and composed of members of the scientific community (Germany, Italy, Norway, Brazil), indigenous river communities (Chiquitano people from Mato Grosso, Brazil and Sámi from Tana River, Sápmi, Norway), municipalities (Wiltshire Council, UK), school communities (Istituto Comprensivo di Medicina, Bologna, Italy) and civil society (Italy, Germany, Norway and Kenya). At the cutting edge of interdisciplinary, globalized, research and policy, Coproknet has been exploring the frontiers of research co-production to unite scientific-informed and practice-based ecological knowledge required for good climate governance, with a specific focus on water.

Scientific background and project objective

Climate change results in changes in the local environment, no matter where one is in the world. For Italy, this means, inter alia, less rain and snow, and therefore fewer water resources. The same complications are seen throughout many regions in Southern Germany, including the area around Bayreuth (Northern Bavaria). Good water governance in times of climate crisis is therefore vital for safeguarding a right to water and actual access to (clean) water. The impact of climate change on natural resources and the local communities which depend on them (e.g. for access to drinking water, water for agriculture, tourism and/or industries) demands solutions from multilevel and polycentric perspectives and new methods in environmental decision-making to cooperatively find both mitigation and adaptation measures that ensure sustainable development and equitable access to water.

Water governance is rapidly becoming an increasingly complex process. Amid the pressures of climate change, population growth, industrialization and urbanization, one of the major challenges faced by global communities is sustainable and equitable access

to water, in a context of water scarcity and drought. The wide-ranging web of actors in water governance calls for integrated, inclusive, and context-sensitive approaches to addressing water problems. A growing number of scholars involved in inter- and trans-disciplinary environmental research have applauded the value of knowledge integration in decision-making to extend the “collective knowledge base” (Malmer et al. 2020: 82; Christie 2011; Thornton and Scheer 2012; Turner et al. 2017). *Coproknet* puts forth that such a collective knowledge base is more likely to effectively address the complicated nature of the contemporary ecological challenges when it is the result of a co-production of knowledge (CoPK). Our central assertion is that CoPK can successfully address the perceived lack of effectiveness of conventional legal approaches, such as the participation of the public concerned in administrative decision-making processes. The conventional approaches are still based on uni-directional decision-making and unilateral knowledge transfer processes, where the role of access rights is limited to the procedural realm. In contrast, CoPK considers and integrates bottom-up perspectives of different knowledge bearers.

It is of note that an integrated, systematic, and implementable definition of CoPK is currently missing in legal research (Norström et al., 2020). Consequently, it is rarely used in decision- and policy-making. Yet, insights from legal research illuminate the resulting detriment. Legal frameworks and their underlying conceptualization often overlook or even exclude fundamental dimensions of key branches of knowledge beyond the discretionary powers of the decision-makers, such as indigenous, traditional as well as local ecological knowledge or knowledge of those too young, less informed, or too remote to be included in formal decision-making and participation procedures. In order to make use of those various aspects of knowledge for policymaking and regulation on national, regional and international levels, it is important to describe the process of “co-production” and critically reflect on the existing and emerging instruments that allow – within the respective legal frameworks – for CoPK.

Based on the research outcomes from previous projects, our group of legal and environmental scholars concludes that, while knowledge co-production (referred to as CoPK) is regarded as a strategic tool for shaping environmental outcomes, it remains a largely unexplored field of research action. Currently, there is an overall lag in effectuating successful interaction between members of the research community and civil society towards the development of a common framework for CoPK. To address this research gap, our project at large is committed to enabling the development and expansion of research methods and practices to support knowledge action systems (natural and marine sciences, law, local knowledge) that stimulate innovative cultural and environmental management of water (primary scientific objective). *Coproknet*’s vision is

to develop a conceptual framework with effective, practical implications, in order to support actual co-production mechanisms in water decision-making. In the interest of creating common knowledge on equitable access to water and water conservation, Coproknet continuously maps and evaluates existing water governance and management practices using the case studies of the governance of the Gesso Stura Natural Park, Cuneo, Piedmont Region and of the Northern Bavarian region around Bayreuth (Oberfranken/Fränkische Schweiz/Fichtelgebirge). This two-fold mapping and evaluation assessment has served as the basis for co-creating a common vocabulary and guidelines for local communities, higher education institutions, as well as researchers and policymakers.

The workshop and the resulting publications were predicated on the following questions which served as the basis of the presentations, discussions and comparative case studies from an interdisciplinary perspective on day 1 and day 3:

How can legal researchers, legislators, policymakers, and communities systematically and effectively define and develop ways to engage with CoPK in environmental decision-making? The applicants inductively approached the research question and the task of describing and defining CoPK from different interconnected angles (water governance, climate change, alternative justice, agricultural law, and biodiversity). Questions to structure the panels of the workshop as well as the initial publication were as follows:

1. Are there examples/best practices from the areas, where CoPK has already led to effective and implementable solutions to the ecological challenges that we are currently facing?
2. How does CoPK produce usable knowledge for local communities? How does CoPK combine scientific and traditional knowledge for adaptation and mitigation of climate change?
3. How does CoPK generate usable knowledge for policymakers?
4. How do existing legal frameworks in Italy and Germany include or exclude certain types of knowledge, knowledge producers, and processes of co-production? Is there a difference between small-scale (regional) regulation, like local by-laws, national legislation, and large-scale (international) regulation, such as international treaties or regional conventions?
5. What socio-legal surroundings does the effective co-production of knowledge in environmental law and policy require? Is there a difference between legal orders as well as between states and the international community?
6. How can CoPK be utilised to influence quality decision-making?

Participants and contributions

The key participants in this event were researchers, academics, representatives of communities and civil society. Moreover, secondary school children from the Istituto Comprensivo di Medicina, Bologna, were invited to present their project “In the Scientist’s shoes” and to participate in the multisensory activities organized by the Gesso Stura Natural Park. There were twenty researchers, twenty-four children and three teachers in total.



Figure 3 The most relevant SDGs for the workshop, starting from SDG 17, 16, 4, 14 and 6. Casa del Fiume. Photo credit: Alessandro Cerato

Day 1

Opening

On April 17, the first round of presentations took place. After an [introduction from Monica Delfino](#) (la Casa del Fiume, Gesso Stura Natural Park) and the council member from the Municipality of Cuneo, Eva Lohse and Margherita Poto opened the session. They explained the context of the project, the structure of the workshop, and knowledge co-creation from a methodological viewpoint.

Co-creation of knowledge as a Methodological Approach in Environmental Law Research (Margherita P. Poto, Arianna Porrone, Juliana Hayden)

Professor Margherita Poto and colleagues Arianna Porrone (Ph.D. candidate UNIMC, Dep. of Political Science, Communication and International Relations) and Juliana Hayden (Ph.D. student UNITO, Dept. of Law) presented their cross-disciplinary findings on the potential for CoPK to be used as a methodological approach in environmental law research. Their multidisciplinary scan of seminal literature across administrative and environmental law, political science, feminism, gender studies, and health studies highlighted that CoPK is productive for increasing public participation in governance efforts. However, CoPK requires careful consideration of the design and implementation of establishing truly inclusive and equitable partnerships and joint research initiatives. Therefore, exploring and applying CoPK as a methodology within the disciplinary and case context of environmental law can help clarify the exact steps needed to appropriately carry out consultation with all parties. This also reflects the right to free, prior, and informed consultation, one of the pillars of participation as laid down in international environmental law. Accordingly, it is expected to be a way to reach acceptable and legitimate research actions and/or legal solutions.

Margherita explained the roots of participatory governance in administrative law. She has applied this approach to citizen-led governance to co-create water knowledge with the Chiquitano People of Mato Grosso, Brazil, who are facing dangerous water scarcity levels and, at the same time, often lack the legal knowledge to defend their rights.

Arianna shared her expertise in rethinking citizenship and outlined the relationship between civil rights, feminist theory, and environmental protection. Introducing the debate on care as undertaken by ecofeminist and feminist scholars, she provided the baseline to recognise oppressive systems embedded in knowledge-making processes. To re-think citizenship beyond the sexist, racist and anti-speciesist boundaries of the dominant Western system of thought, and thus facilitate a transition to a politics of interdependence, she then employed the ethical horizon opened by care.

Juliana demonstrated how the case studies of Margherita and Arianna could be explained through the participatory research method “Delphi Method”. This consensus-based method that uses anonymous, iterative survey rounds was proposed as a tool for gathering perspectives and co-creating knowledge on emerging and/or sensitive topics, common in water governance.

Co-creation of knowledge for the governance of the commons: experience from the ground (Adele Owens, Andrew Morrison)

Adele Owens and Andrew Morrison presented their experience in the field of co-creation of knowledge in the Wiltshire Community, UK. In recent years, Great Britain has faced a series of significant events, including Covid-19, Brexit, climate change, the war in Ukraine, and ongoing economic challenges. These events have given rise to various issues, such as a cost-of-living crisis marked by food and fuel inequalities, high inflation, steep rental costs, and a decrease in investments in public services. Consequently, it has become increasingly crucial to foster equity and resilience within communities. Recognizing this need, Wiltshire Council has embraced an inquiry-led and co-productive approach known as Community Conversations. Through this approach, Wiltshire Council aims to gain a deeper understanding of the experiences of individuals living and working in marginalized communities. This understanding will serve as a basis for driving social change and enhancing social, economic, and environmental outcomes. Community Conversations represents a co-learning initiative designed to revolutionize Wiltshire Council's comprehension of the lives of its most vulnerable residents. By adopting this approach, the council seeks to co-create new support systems that prioritize people's needs holistically, departing from the conventional top-down approach focused solely on service delivery. The ultimate objective is to foster stronger community bonds, cultivate resilience, and empower individuals to achieve their fullest potential in life.

Co-creation for environmental participation: the Escazu agreement in comics (Giulia Parola)

The presentation retraced the methodological steps that resulted in the co-creation of the Escazú Agreement in the form of comics, with the aim to make an international agreement on participatory environmental rights accessible and co-owned by its addressees. The participants of the co-created project were community members from the Chiquitano Indigenous people of Mato Grosso, legal scholars and law students from Rio de Janeiro, Brazil. During the presentation, Giulia Parola explained also how the process of co-creation is realized through two techniques, Legal Design and Visual Law. These visual techniques help elaborate on clearer and more transparent, adequate legal solutions for the law recipients, the legal entities, and society at large. The objective of the project was to teach students, in practice, an efficient method to create understanding and engagement in environmental law. Simultaneously, the project aimed to support the co-production of education resources with and for the Chiquitano people, which could act as a tool for strengthening environmental participation. Finally it was outlined the different steps of the project by clarifying the methods used and overarching methodology of co-creation.

Day 2

Co-creation and water from the viewpoint of ecotourism (Stefano Duglio)

Prof. Stefano Duglio, after introducing the role of tourism as an economic sector and within the context of the Sustainable Development Goals and their targets, dealt with a specific subsector, i.e. ecotourism, underlying its role as a flywheel for co-creation in research projects.

In doing so, Prof. Duglio referred to two ongoing research activities that are carried out in the Northwestern Italian Alps and, in particular, SCI-ALP - Economic and environmental sustainability of low-altitude micro-ski resorts, and AWGP - Alagna Walser Green Paradise. In both cases, the involvement of local communities in co-working strategies and the role of water in ecotourism products have been presented.

An example of co-creation from Mato Grosso: Tarumã, waters that speak (Giulia Parola, Cecília Campos)

Professor Giulia Parola and Cecília Campos presented a legal design and visual law project, co-created by law students and the Chiquitano indigenous people from Mato Grosso, Brazil, regarding the pollution of Tarumã River and the threats to access to water. Cecília Campos explained the co-creation and legal design steps followed during the project: (i) first, the cooperation of all participants; (ii) then, how they applied legal design and visual law to the case study; (iii) the selection of the participants/recipients (Chiquitano People); (iv) the importance of studying the indigenous people, their needs and the socio-environmental conflict related to the pollution of Tarumã River; (v) how they created the proposal and the story itself; (vi) and also how the illustrations were produced. As explained by Professor Giulia Parola, the book includes a scientific rationale concerning the research and methodology which stemmed from a novel, innovative process of co-creation; and a co-created illustrated story, as a result of a groundbreaking collaborative research effort between ECO_CARE team members, law students of UNIRIO (Brazil), representatives of Chiquitano People (researchers, teachers and community members), as well as school pupils from the Chiquitano school in the village o

Posters by Bayreuth students on questions of co-production, water management and renaturation (Alexander Ströher, Marius Fischer, Thorben Weidelt, Marina Engst)

The morning concluded with a poster session by four undergraduate students in law (with a focal area in environmental law) and in eco-engineering. All presentations focused on aspects of water governance and their possible links to co-creation:

Presentation 1: A Change in Peatland Agriculture in Germany (Thorben Weidelt)

Thorben Weidelt held a presentation on establishing a change in peatland agriculture in Germany. Currently, more than 5% of Germany's Greenhouse Gas Emissions originate from peatland soils and, as more than 70% of Germany's peatland soils are utilized in agriculture, there has been a call from scientists to rethink the current definition of 'good professional practice' and establish a new, more climate-friendly and sustainable practice. The 'good professional practice' is a set of standards of conduct in German law under which agriculture is supposed to be sustainable and to cause no harm to nature. However, sustainability and effective conservation of peatland soils is not achieved by current practice, either in reality or in law. To address this issue, a transition to agriculture with a minimum mean water table has been proposed, as water saturation is key for peat conservation. The paludiculture, the concept of agriculture on wet peatland, allows effective land use while most of the peatland's ecosystem services are still being provided. But the implementation of paludiculture also poses multiple challenges. Rewetting on a large scale requires a new legal and infrastructural framework for local water management as the current framework is geared towards drainage measures. Furthermore, there is still considerable room for improvement in harvesting technologies on wetlands. In the process of solving these problems, communication and cooperation between different stakeholders and actors is mandatory.

Presentation 2: Incorporation of extra-judicial knowledge by means of environmental adjudicative bodies (Alexander Ströher)

How can scientific knowledge be better integrated into judicial pronouncements in environmental law? What problems obstruct the transformation of extra-legal knowledge into law? Environmental issues are complex and require a multidisciplinary approach that involves expertise from different fields. However, traditional legal systems may not always be equipped to handle these complexities adequately. The presentation discussed two key issues related to the incorporation of extra-judicial knowledge: the laymen-expert communication issue and the de facto margin of appreciation of private expert agencies. Relying too heavily on expert opinion may risk the judge becoming an enforcement assistant of the expert witness, leading to a loss of confidence in the legal system. The proposed solution to these challenges is establishing dedicated environmental chambers by inserting § 188c into the German Code of Administrative Court Procedure (VwGO). Existing literature shows that specialized legal bodies can increase the receptiveness of scientific knowledge and competence among the judiciary as well as improve interdisciplinary dialogue between judges and expert witnesses. Furthermore, this proposal renders judges less dependent on and susceptible to the influence of expert witnesses. It is important for judges to remain active and impartial participants in the

decision-making process and to evaluate expert opinion critically within the broader legal framework.

Presentation 3: The EU-WFD, its non-deterioration principle and individual legal actions (Marius Fischer)

Water pollution due to human activities is a growing concern. Effects of water pollution include reduced access to clean water, loss of biodiversity, and negative impacts on human health.

The EU-WFD is a key piece of EU legislation aimed at protecting and improving Europe's water resources. The WFD requires member states to achieve good ecological and chemical status in all surface and groundwater bodies. The Directive includes a prohibition of deterioration, which requires member states to prevent any further deterioration in the status of their water bodies. The prohibition of deterioration is a key component of the WFD, as it aims to ensure that water quality is maintained or improved over time.

The prohibition of deterioration is enforceable through legal action, such as lawsuits brought by individuals or environmental groups, or through administrative enforcement by government agencies. The ECJ ruling in case C-197/18 reinforces the right of individuals to bring legal action to enforce the WFD.

Overall, the EU Water Framework Directive and its prohibition of deterioration are crucial for protecting and improving water quality. The right of individuals to bring legal action to enforce the directive is essential for ensuring compliance with EU environmental law. Together, they provide a framework for sustainable water resource management in Europe.

Presentation 4: Art. 9WFD: The cost-by-cause principle and the Internalisation of costs for the inputs of pollutants in waters (Marina Engst)

The Art. 9 WFD has two main principles. These are the cost recovery principle for water services and the cost-by-cause principle. For the cost recovery principle, the environmental and resource costs and the economic costs have to be recovered. The cost-by-cause principle is mainly realized within the polluter pays principle. According to the polluter pays principle the polluters have to pay the costs they cause for damaging the environment. According to the Art. 9 WFD and the cost recovery principle these costs mainly are higher costs for water treatment.

Despite the Art. 9 WFD polluters often do not pay the costs they cause. However, there are some solutions. One solution is a comprehensive water utilization levy. This would be precise, easy, and fast in advantage. Another solution is the taxation of pollutants. Thereby it is easy to reach the target group, but high taxation and a wide regulatory space would be necessary. The third solution is the fund solution. Therefore polluters pay dues

into a fund, that covers the costs. Here the costs would be covered and the polluters would have an incentive to reduce their inputs of pollutants.

Finally, there are solutions that would guarantee a better implementation of the Art. 9 WFD. But in the end, it is up to the national legislators to achieve a better implementation of the Art. 9 WFD.

Introduction to Education Through Research (Giuliana Panieri)

The afternoon started with a presentation by GPanieri from the Department of Geosciences at UiT presenting how it is possible to engage with pupils through a scientific project and an expedition in the Arctic Ocean. Her presentation focused on the CAGE22-1 AKMA2/Ocean Senses Research expedition on board Kronprins Håkon occurred in May 2022 (Panieri et al. 2022). She explained how scientists on board worked across research and education to develop classroom tools to bring the ocean floor to life for all our senses (touch, sight, hearing, smell, or taste). The expedition aimed to collect data from “extreme environments”, such as areas characterized by natural methane emissions, and develop prototypes that can be used to teach different aspects related to “oceans”. The prototypes were developed by teachers and scientists and will be used in high schools and university courses in Norway, Italy, France, Kazakhstan, Portugal, Brazil, Tanzania, and Botswana. We also want to make these activities as inclusive as possible so that they can be used in schools and classes with hearing- and sight-impaired students. Panieri also explained how the data collected during the cruise were used by the school class at G.Simoni to create a “conference” involving pupils. For the conference, the students wrote abstracts that were then presented to the local communities and the municipality during a conference organized in Medicina. Panieri provided comments on the abstracts written by the pupils and participated in the conference.

The ocean is something distant and abstract for most of us. Through this project, Panieri aims at getting more students and all of society to feel and get to know the ocean in a more personal way.

In the Scientist’s shoes: Scuola Secondaria di Medicina (Bologna) presenting their projects on the river coordinated by Gloria Gordini, Elena Astore and Angela Lanzone.

The pupils of the Scuola Secondaria di Medicina, coordinated by their teachers, presented their project conducted in the Canale di Medicina and concerning the qualitative analysis of the waters of local waterways and naturalistic observations of the territory. Through the Inquiry-Based Learning methodology, the pupils made conjectures, verified, learned from their mistakes and interpreted the results obtained from direct experimentation. The aim was to analyse the water quality of the local Canale di Medicina using different

kits based on colorimetric reactions. The experimentation was divided into several steps. The first step was to collect the waters of the canal from various points, the collection areas were chosen based on the possibility of easily accessing the site. The second step was to observe in the various sampling points which species of plants and animals were present. The third step was to analyse the water sampled. Precisely it was possible to measure the quantity of Nitrates, Phosphates, Carbonates and Sulphates. The kits available are based on oxidation/reduction or acid-base titration methods. The data collected showed a certain increase in the number of nitrates and phosphates along the route of the canal from the first sampling point to the last, the hypothesis is that travelling mainly through an agricultural environment, the increase may be due to the leaching of the fertilised land. The amount of these compounds has not exceeded the levels regulated by law. The analysis of the number of carbonates and sulfates does not seem to undergo any increase. The pupils then carried out other measurements and analyses of the sampled water. The bacteriological tests showed the presence of bacteria, as was to be expected. For technical reasons, it was not possible to determine which types of bacteria. It was not possible to detect any macroinvertebrates or protists.

The results were shared with the audience of researchers and practitioners, who asked the children many questions and opened a debate on the strengths and weaknesses of this empirical work, reflecting on the challenges to develop a scientific project in English and French and to deliver the results to a multidisciplinary and international audience. After the debate, the pupils conducted some further experiments, analysing the water of the rivers Gesso and Stura, concluding that the waters appeared to be extremely clean.

Day 3

On the last day of the workshop, all participants endeavoured to bring together the results of the various presentations and other workshop sessions in order to think and discuss co-creation of knowledge in over-arching terms. The session was facilitated by Irina Lawrenz and Paul Schafmeister (both University of Bayreuth) and designed to collaboratively assess co-creation of knowledge in a way that itself was collaborative in nature: the session aimed to explore co-creation of knowledge using tools of co-creating knowledge.

After collecting the participants' ad-hoc associations with the term 'co-production of knowledge' in order to create a snapshot of the issues presently engaging the participants, five distinct but interconnected questions relating to co-production of knowledge on a meta-level divorced from exemplary modes of application were tackled using a method inspired by the 'Alone Together' approach. The areas of discussion were broadly prepared by the facilitators of the workshop and clustered around the following questions:

- *What distinguishes co-creation from participation?*

- *Are there limits to co-creation?*
- *What are the biggest obstacles to the practical implication of co-creation? How can we overcome them?*
- *Where lies the potential for increased use of co-creation in your discipline?*
- *What can incentivise utilising co-creation as a tool in decision-making processes and knowledge production?*

In order to encourage everyone to contribute in a non-constraining way the participants were first invited to ponder the questions individually and to anonymously put their ideas pertaining to each question on charts matching with the question thereby creating a collage of ideas. Afterward, everyone was invited to present and elaborate on their thoughts which could then be debated collectively. With these clusters of ideas set out, we tried to map the field, draw connections between different issues, and were able to compare different structural approaches to the subject area 'co-creation of knowledge'.



Figure 4 The final workshop. Photo: Giuliana Panieri

Ways forward and next event

The teams' insights on the relevant methods and functioning mechanisms of co-creation of knowledge and its inclusion in legal and political decision-making processes will be published as a co-authored book with a German publishing house (Berliner Wissenschaftsverlag). The writing process will be accompanied by two virtual meetings attended by all authors in order to consolidate the findings and the texts. The publication will be structured through the utilization of a questionnaire on methods of co-production and participation in the relevant field in order to make the interdisciplinary findings comparable. It is anticipated that the book will comprise 150-200 pages and will be edited by the Chair for Public Law III, therefore requiring a student assistant to help with the editing process and proofreading. A dissemination and communication (DC) plan will be established by Coproknet members in order to reach epistemic communities, NGOs, and relevant EU and national level policymakers, who may benefit from the book's insights and strategies. The aims of the forthcoming DC plan include: creating learning materials with a focus on water; generating visibility for Coproknet education and research initiatives; raising awareness of environmental governance challenges and strategies, particularly in the field of water governance; providing greater access to co-created water knowledge; increasing the ability of all interested parties to engage with and participate in, co-created water knowledge; integrating the processes that result in co-creation within the field of environmental governance.

Reference list

LOHSE, POTO, *Coproduction of knowledge in Climate Governance*, Berliner Wissenschafts-Verlag, 2022, ISBN 978-3-8305-5538-4.

MURRAY, POTO, CHAPTER IV: Co-creation of educational spaces and curricula to develop an ecology of participation: an example from Follow Your Heart in LOHSE, POTO, *Coproduction of knowledge in Climate Governance*, Berliner Wissenschafts-Verlag, 2022, ISBN 978-3-8305-5538-4.

MURUNGI, LESEGI, POTO, LOHSE, CHAPTER VI: Climate change related disputes in North Kenya: how Kenya's Alternative Justice Systems could utilize co-production of knowledge to curb pastoral violence in LOHSE, POTO, *Coproduction of knowledge in Climate Governance*, Berliner Wissenschafts-Verlag, 2022, ISBN 978-3-8305-5538-4.

MWANGA, GONZA, POTO, LOHSE, CHAPTER VIII: Missing the mark in law: creating a sustainable legal and policy framework for Indigenous Knowledge on climate change

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