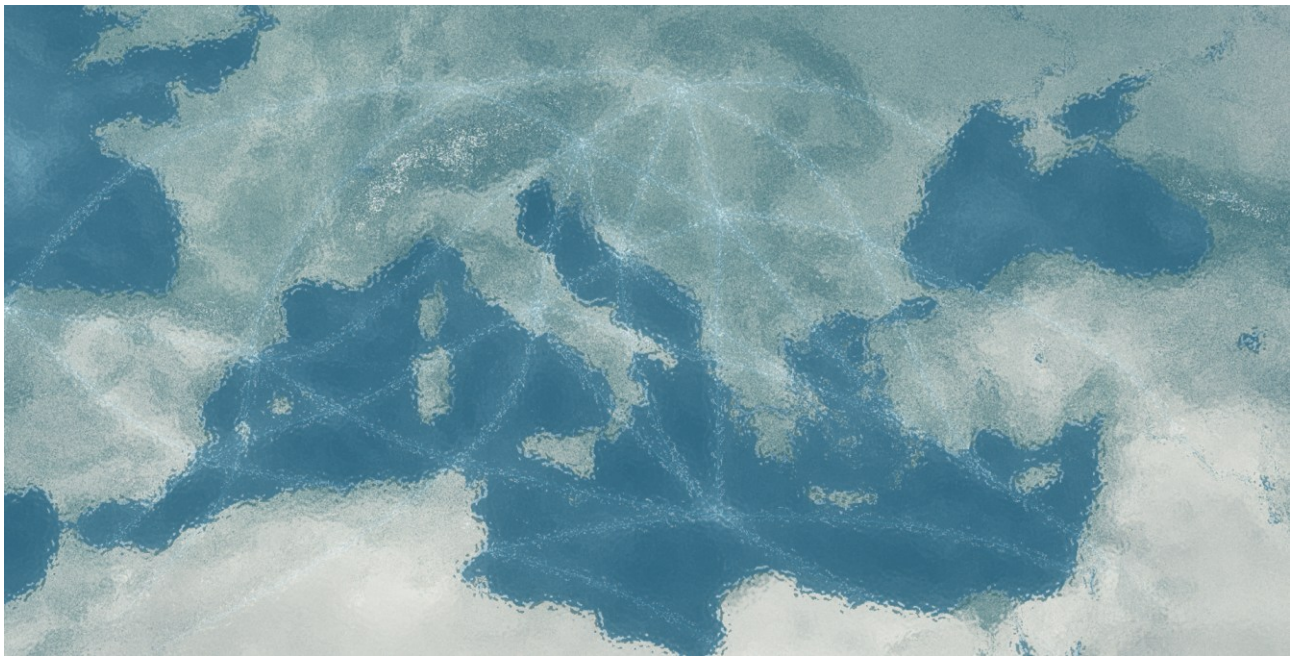

UNIVERSITÀ DEGLI STUDI DI BERGAMO | Dipartimento di Lingue, Letterature e Culture Straniere

International Workshop

Hydropolitics in Italy, Europe, and the Mediterranean region

27 – 28 November 2025
Via Salvecchio, 19 (Room 1 and 2) - University of Bergamo

BOOK OF ABSTRACTS

In the occasion of the conclusion of the Marie Skłodowska-Curie Project

JustWATER - Water Decision Making Tools for Informed Hydropolitics in Italy

UNIVERSITÀ DEGLI STUDI DI BERGAMO | Department of Foreign Languages, Literatures and Cultures

Marie Skłodowska-Curie Actions

CST Centro studi sul territorio Lelio Pagani – Università degli Studi di Bergamo

IMAGO MUNDI LAB

Contents

1. THEORETICAL INTRODUCTION TO THE WORKSHOP

CONCEPT NOTE: GEOGRAPHICAL FOCUS

The international workshop 'Hydropolitics in Italy and in the Eu-Med Region' explore the role of national governments in building their own hydropolitics. Italy, in particular, will be the focus of the first session, while Europe and the Mediterranean area, including Italy, will be the main protagonists of the entire workshop.
Italy, with its fragmented institutional framework and the Italian approach in the implementation of the Water Framework Directive, its institutional actors, NGOs, civil society and academia will be both under investigation and are invited to express their view on the topic

With the aim of establishing a criteria for a (im)possible Comparative Hydropolitics with an horizonal hypothetical line across the countries of South and North of the Mediterranean and adding a vertical comparison to include North and South Europe, the workshop will show how different countries in the same legislative framework (Europe) or sharing the same hydro-climatic challenges (Mediterranean countries) , do respond to their water need or fail to respond. A comparison across European and non-European water legislation; a comparison between Mediterranean and non-Mediterranean countries will provide a set of elements to better understand the situation of the Italian hydropolitical reality. Climatically placed at the centre of the Mediterranean, the north of Italy shares more similarities with other Alpine countries. Climatic, economic, social, and power dynamics related to the construction of water national strategy will be investigated.

AN EVOLVING LEGISLATIVE FRAMEWORK FOR WATER IN THE EU AND THE MEDITERRANEAN

With increasing demand for water, climate change and geopolitical challenges, the sustainable management of water resources has become a crucial issue for stability and development in the region. The workshop is particularly timing because from September 2025 Italy will have to start implementing the EU Nature Restoration Law (NRL) which includes restoration of water environments and their biodiversity. How does the restoration of rivers interconnect with prevention of floods?

How does the pollution of groundwater interconnects with the need to protect and recharge depleted aquifers? How agricultural irrigation connects with the need to prevent and mitigate future droughts in Italy? These are just some of the main discussion points of the workshop.

In addition to that, the New Water Resilience Strategy of the European Commission is also part of the new hydropolitical discourse in Europe, with, in parallel, the new development of the "European Pact with the Mediterranean" aimed at deepening the cooperation with its southern Mediterranean partners, focusing on three pillars: people, economy, and security. How water is part of these three pillars and / or interconnects with all of them, will also be discussed during the workshop.

THEORETICAL FRAMEWORK

In order to have a comprehensive overview of the theoretical foundations underpinning the JustWATER workshop, it is important to clarify that many are the fields of provenience of the variegated types of presenters: political representatives in the field of water and water politics, regional representatives, NGO representatives, journalists, PhD students , academic researcher, professors and field practitioners. This variety of

voices will give the workshop a multilateral perspective on the main topic on stage: hydropolitics.

The topic of hydropolitics will be critically analyzed from perspectives originating from political ecology, hydrosocial theory, international water law, hydrology, and development studies. Furthermore, the workshop will deploy and give floor to the presenters who will contextualize how each concept will be applied or interpreted by the respective perspective, territorial unit of analysis or theoretical point of view.

CRITICAL HYDROPOLITICS AND CRITICAL WATER GEOGRAPHY: POLITICAL ECOLOGY PERSPECTIVES IN DIALOGUE WITH GEO-POLITICS OF WATER

Narratives, Policies & Hydro-Social Lens: Neoliberal Hydromentality & Informal Hydro-Citizenship, Hydrosocial Cycle, Procedural and Distributive Justice, Hydro-Hegemony, Civic Ethnography & Internal Colonialism.

Stemming from the background of Political Ecology, Water Governmentality will be operationalized for the Italian case. Fragapane analyzes water scarcity in Sicily through the lens of 'neoliberal hydromentality' and develops the concept of 'informal hydro-citizenship.' How citizens respond to unreliable infrastructure through kinship-based sharing and informal economies, illustrating adaptive practices shaped by uneven governance (Hellberg 2018) The concept recurs throughout Panel 1, especially in Fragapane's and Diantini's work, to describe water as a socio-natural process shaped by infrastructure, policy, and everyday life (Linton & Budds (2014)

Environmental Justice will help understanding the comparative study on delta regions of Italy and the Nethelands, integrating these justice dimensions to analyze inequalities in climate adaptation strategies (Schlosberg (2007)

Borrowing the main theoretical tools from Political Anthropology and Postcolonial Studies, Civic Ethnography will reveal the symbolic and governance divide between central authorities and local communities in the Paglia River basin, critiquing top-down hydraulic planning as internal colonialism (Scott 1998, Hecht2012)

From the theoretical school of Critical Hydropolitics, hydro hegemony theories will be applied to analyze how state and private actors exert control over water resources in

Basilicata, showing the region's transformation into a sacrifice zone (Zeitoun & Warner 2006)

Using the main tools of Water Law and Institutional Economics, Marangi critiques technocratic governance using Ostrom's concept of "water as a common" and advocates for participatory water management through socio-hydrology (Ostrom 1990)

Ideology & Nationalism in Euro-Med Water Security

Official Narratives & Discursive Politics in the political ecology of Hydropolitics in the Euro Med area

Using discourse analysis, the workshop will cover the critiques to Morocco's state-driven water discourse, highlighting blind spots in agricultural policy and showing how media narratives obscure structural overexploitation (Bakker 2012; Hajer 1995)

Passing into the Field of Urban Political Ecology, Pourmohsen examines Istanbul's infrastructural development and water scarcity discourse, revealing how urban megaprojects are framed as nationalistic and depoliticized solutions (Swyngedouw et al. 2006)

In the realm of Political Economy, Water Public Services will be the focus of an analysis of Re-Municipalisation & Service Governance. La Vena explores water service management in Albania and North Macedonia through re-commoning strategies and critiques of EU-led governance reform (Lobina (2012; Bieler & Jordan 2018)

Envirotechnical Regimes

In the field of history of Technology and Political Ecology, De Luca's analysis of the Swiss Italian Valle di Lei Dam reveals how concession politics and value extraction constitute envirotechnical systems reinforcing spatial inequality (Pritchard 2011)

THEORETICAL LINKS WITH THE MARIE SKLODOWSKA CURIE PROJECT JustWATER

From the theoretical school of Critical Hydropolitics, JustWATER aims at enabling the definition of hydro-hegemons in Italy, in terms of Virtual Water management, water abstraction, water grabbing and virtual water exports from water-scarce hydrological bodies.

Borrowing from political ecology of critical water geographers, and from the tradition of development studies, JustWATER explores the possibility of creating a common ground for similar disciplines.

Firs of all, JustWATER proposes a new terminology: WATER SUBALTERNS, or "water subalternities" as opposed and complementary to hydro-hegemony to promote a shift of focus from the power-exerting actors to the power-taking (o disempowered) actors of hydropolitics.

Secondly: JustWATER aims at mapping water bodies in terms of over abstraction in order to provide open source and free access to geo referred data regarding Italian water bodies that are most affected by abstraction. This research product enables the disclosure of specific water bodies, in each region, where the pressure of the water footprint of irrigated water is higher.

Third: JustWATER scrutinize gendered analysis of water governance, management, and everyday practice in the water sector, including agriculture and migrant work , focusing on women and men, their presence and political influence in the water sector.

PANELS WILL REVOLVE AROUND THE FOLLOWING QUESTIONS

- Is the European Water Framework Directive an appropriate instrument for the Italian peninsula, which is characterized by so many different pedoclimatic and hydrological units? Is it appropriate regarding the socio-economic context of the country? What are the main expectatons towards the new European Nature Restoration Law, the new EU Water Resilience Strategy, and the new European Pact with the Mediterranean?
- Which narratives are currently shaping national hydropolitics in Italy/other European and Mediterranean countries? Analysis of Italy and its national hydropolitical strategy and policies. Can socio-hydrogeology and hydro-social approach help in understanding the Italian case?
- How can nationalism and ideology shape/ and if yes, are shaping the construction of new water security issues in the European and Mediterranean area? Analysis national hydropolitical strategy and policies of the European and Mediterranean countries / case studies. Can socio-hydrogeology and hydro-social approach help in understanding?
- What is the role of agriculture in shaping national hydropolitics and what is the role of food trade? What and who is shaping water-food security in Europe and

Mediterranean area? Presentation of findings of the JustWATER project addressing the topic: What is the role of agricultural exports in the use and exploitation of Italian water resources?)

- How do scientists communicate water and how do politicians communicate water? And what is the role of media and press? Science-Policy dialogue works for water?
- How do agricultural irrigation and soil -water management connect with the need to prevent and mitigate future droughts, floods, and landslides in the EU Med area in the light of climate change? What is the political role of green water? Practical examples from practitioners and hydro-political discussion on the subject of green water, soil moisture, and its role.
- What is the role of women and men in the water sector in Italy and in the European and Mediterranean countries? Do we have gender and masculinity issue in the water sector?
- Comparative water policies: similarities characterizing Italy and other European and Mediterranean countries in water politics and policies: case studies. Is it possible to exchange examples and strategies from other EU and MED countries, which are applicable to Italy? Cross-cutting themes: WEFE nexus approach, climate change challenges and climatic hot spots, the role of desalination in the region. What is the role of PRIMA projects in providing an appraisal on the subject?

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2. Scientific Committee

Federica Burini
Alessandra Ghisalberti
Francesca Greco
Filippo Menga
Stefano Morosini
Marco Tononi
Naho Mirumachi

3. Organising Committee

Elisa Consolandi
Edmondo Pietrangeli
Dauro M. Zocchi
Ana Elisa Cascão

4. Hydropolitics: Introductory session

What is hydropolitics? Geopolitical Water Challenges in the 21st Century

Filippo Menga
(Associate professor, University of Bergamo, Italy)

Nature Restoration Law in the EU framework

Stuart Orr
(President of International River Foundation and former WWF International Head of Freshwater, Australia)

Hydropolitics in Italy

Nicola Dell'Acqua
(Italian Extraordinary Commissioner for water scarcity, Italy)

5. JustWATER project: Marie Skłodowska-Curie Action

JustWATER project: Marie Skłodowska-Curie Action: theoretical framework, methodology, results, and way forward

Francesca Greco
(Marie Skłodowska-Curie Researcher, University of Bergamo, Italy)

ABSTRACT

From the theoretical school of Critical Hydropolitics, JustWATER aims at enabling the definition of hydro-hegemons in Italy, in terms of Virtual Water mobilization, water abstraction, water grabbing and virtual water exports from water-scarce hydrological bodies.

Borrowing from political ecology of critical water geographers, and from the tradition of development studies, JustWATER explores the possibility of creating a common ground for similar disciplines.

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Secondly: JustWATER aims at mapping water bodies in terms of over abstraction in order to provide open source and free access to geo referred data regarding Italian water bodies that are most affected by abstraction. This research product enables the disclosure of specific water bodies, in each region, where the pressure of the (blue) water footprint of irrigated water is higher, opening avenues for the subsequent investigation of water grabbing at regional level.

Third: JustWATER scrutinizes gendered analysis of water governance, management, and everyday practice in the water sector, including agriculture and migrant work, focusing on women and men, their presence and political influence in the water sector.

6. PANEL 1 – HYDROPOLITICS IN ITALY: NARRATIVES, POLICIES & HYDRO-SOCIAL LENS

MODERATORS

Stefano Morosini (Rector's Delegate for International Research in Human Sciences and Law Area, University of Bergamo, University of Bergamo)

Jeroen Warner (Associate professor of Sociology of Development and Change, Wageningen University, The Netherlands)

The Gleno Dam: Survey, Investigations and Structural Analyses on the Centenary of the Disaster

Presenting author

Andrea Belleri
(Associate professor, University of Bergamo)

ABSTRACT

in progress

Starting from What Remains: The Gleno Disaster Between History and Landscape, Memory, and Future (1923–2023)

Presenting author

Lorenzo Migliorati
(Full professor, University of Bergamo)

ABSTRACT

in progress

DAMS: Environmental Conflicts between Italy and Spain in an environmental history perspective (DAMSECIS)

Presenting author

Judit Gil Farrero
(Marie Skłodowska-Curie Researcher, University of Bergamo, Italy)

ABSTRACT

Renewable energy has become a crucial issue in the current socio-ecological crisis, but in recent years its generation through large wind and solar farms is causing environmental conflicts, as has happened with dams. However, the hegemonic narratives about dams tend to be very positive and there are few analyses of them as conflict and "sacrifice zones" from an environmental history and environmental justice perspective that consider their impact on local communities over time. There is also a lack of studies on the construction of dams in a country as a whole and comparison between countries to get an international overview. This project aims to fill these historiographic gaps, identifying the elements that turned dams into environmental conflicts, analysing their impact on local communities since their planning or construction onwards, and constructing an overview of dam building in Spain and in Italy since 1900 to the present time, adopting a comparative and international perspective and revealing what hegemonic narratives have hidden and silenced. Both southern European countries are similar in terms of climate and rainfall pattern, internal territorial differences, and political history in the last century, and they are the 1st and the 3rd most damned countries in the EU. The reconstruction of a comparative history of dam building can allow a better understanding of the current resistance phenomena to renewable energy projects and a territorial mediation in these conflicts. The research will be based on information gathered in archives, media, written and audiovisual materials and through interviews and field trips.

The Southern Question Refracted Through Water (Sicily, informal hydro-citizenship, EU policy silences)

Presenting author

Sophia Fragapane
(Research assistant, University of Gothenburg, Sweden)

ABSTRACT

Theoretical Framework
Shaped by fragmented infrastructural temporalities—deferred maintenance, perpetual incompletion, and uneven modernisation—chronic water scarcity in Sicily is not merely a hydroclimatic reality but a politically produced condition. This research draws on the hydro-social cycle and biopolitical theories of water governance, examining how scarcity is sustained by informal water economies and differentiated forms of citizenship. Building on Hellberg's (2018) notion of neoliberal hydromentality, this study traces how scarcity governs through uneven expectations of responsibility, situating this dynamic within Sicily's distinct historical and spatial context. Gramsci's "Southern Question" offers a critical extension, showing how subalternity and the failure of the state to secure hegemony in the South reproduce conditions where informal arrangements become normalised and marginalised communities internalise scarcity as routine.

Methodology
The research is grounded in long-term, embedded ethnographic fieldwork in the towns of Santa Elisabetta, Raffadali, and Siculiana in Agrigento province. Informed by an insider–outsider positionality shaped by decades of lived experience, the study draws on informal conversations, site observations, and everyday engagements across domestic, communal, and infrastructural settings. Through sustained immersion, informal conversations, and attention to both local infrastructures and policy silences, the study traces how households and neighbourhoods endure, negotiate, and rework water scarcity everyday. This approach reveals not only institutional shortcomings but also the vernacular logic and adaptive practices that underpin local water resilience.

Original Material or Theory
The paper introduces "informal hydro-citizenship" to describe how residents navigate unreliable water systems through kinship-based sharing, reuse of abandoned infrastructure, and reliance on tanker economies. These practices illustrate both resilience and the ways informal systems emerge in place of the state. Building on Hellberg's (2017, 2018) work in South Africa, the research situated Sicily within a broader hydropolitical geography where state withdrawal and responsibilisation narratives—"resilience" and "adaptation"—naturalise unequal conditions. This raises comparative questions: How do materially distinct yet politically analogous contexts across the Global North and South normalise deprivation in the name of sustainability?

Type of Analysis

Combining political ecology, biopolitical theory, and critical infrastructure studies, the analysis traces how scarcity is produced through contradictions in Italy's water governance—particularly under EU frameworks like the Water Framework Directive, NRRP, and Nature Restoration Law. It examines how "green transition" narratives obscure the lived realities of peripheral communities, where infrastructural neglect and responsibilisation discourses converge. Informal actors—such as tanker operators and brokers—are both vital and symptomatic of state retreat. The concept of "fractured techno-nature" (Giglioli & Swyngedouw, 2008) captures how infrastructure is ever-present in discourse yet persistently failing in practice.

Conclusions

Engaging with narratives of water hardship and ingenuity, the study shows how water governance in Sicily operates through presence and absence, provision, and neglect. Southern Italy's "internal peripheries" are critical sites for understanding hydropolitical. As Italy begins to implement the Nature Restoration Law and new resilience strategies, this research highlights how structural inequalities are reproduced through both hydrological systems and the institutional architectures tasked with their reform.

Managing rising seas: water policies between the Po River Delta and the Netherlands

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Presenting author

Alberto Diantini
(Post doctoral researcher in Geography, Department of Humanities, University of Ferrara, Italy)

Co-authors

Jeroen Warner
(Professor of Sociology of Development and Change, Wageningen University, The Netherlands)

ABSTRACT

Deltas are socio-ecological systems co-evolving under coupled human–water dynamics. Accelerating climate change-sea-level rise (SLR), altered precipitation, longer droughts, compound, and cascading events, salinisation and sediment deficits—reconfigures risk regimes and undermines long-standing promises of protection (Hill et al., 2020). This contribution compares two emblematic European cases, the Po River Delta (Italy) and Rhine-Scheldt Delta (the Netherlands), to investigate how water policies evolve and how narratives of "resilience" and "adaptation" translate into governance arrangements, cost–benefit allocation, and procedural justice. We adopt a hydro-social perspective, coupled with procedural and distributive fairness, to analyse the Netherlands' soft turn - aligned with "Building with Nature" and adaptive delta management - and the Po Delta's predominantly hard approach of high levees, continuous pumping, and river rectifications. Methods include semi-structured interviews with key actors (reclamation consortia, municipalities, farmers,' and fishers' organisations, among others), a review of policy and technical documents (flood-risk management plans, Delta Programme materials, regional adaptation strategies), and socio-economic territorial data from public agencies and municipalities. Centuries of land reclamation and hydraulic works in both study areas have nurtured a false sense of security, slowing public debate on transformative measures. In the Netherlands, after a first phase dominated by rigid defence, from the late 1980s - and especially since the 2000s - a softer policy mix has emerged: "Room for the River" (giving room to controlled flooding), "Building with Nature" instruments such as "wisselpolders" (alternating polders temporarily flooded during peaks to trap sediments) and "depoldering" (lowering, setting back or even removing dikes to reintroduce tidal dynamics) (Warner et al., 2018). These measures for restoring some estuarine and floodplain dynamics have attracted international attention, including in the Po delta; however, participation has often been limited, costs and benefits unevenly distributed, and acceptance hampered by a "worse-before-better" temporal profile, while the dominance of hard infrastructure is not fundamentally altered. In the Po Delta, the prevailing line remains one of maximum resistance (Bertoncin, 2004). Farmers are adapting autonomously by shifting to less

water-demanding and more salt-tolerant crops, while reclamation consortia are developing measures to cope with increasingly frequent climate extremes.

Yet a shared long-term vision is lacking. In a Mediterranean hotspot where relative SLR could reach about +2.9 m by 2150 when combined with subsidence (Vecchio et al., 2024), purely defensive strategies appear unsustainable. Academic work (Di Giulio et al., 2017) has advanced progressive, controlled inundation and selective retreat scenarios that would sacrifice least-productive farmland to safeguard infrastructures and high-value areas. But are these proposals ecologically effective, financially viable, and crucially socially acceptable? What do residents want, and under which conditions-compensation, benefit-sharing, governance safeguards—would they support such pathways?

Our preliminary conclusion is that nature-based water policies are viable only under specific conditions: early, binding co-design with stakeholders; transparent compensation and benefit-sharing. The challenge is to co-produce locally owned adaptation pathways—technically credible, socially fair, and financially robust—that turn citizens from passive recipients into active partners in shaping the future of delta areas.

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Shall Rome not be flooded: The Paglia River “factory”: central institutions and local communities

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Presenting author

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ABSTRACT

The Paglia River originates on Mount Amiata and, with a predominantly torrential course of approximately 85 km, wedged between the hills and volcanic reliefs of the area that was once Etruria, flows into the Tiber. It does so south of Orvieto, after crossing the provinces of Siena, Viterbo, and Terni. Its territory, which is lithologically and orographically unique, is rich in animal and plant biodiversity; at every turn, the landscape reveals interesting forms of material cultural heritage.

Between April and August 2025, a Public Debate was held on the Feasibility Document for Project Alternatives (Docfap) ‘Reservoir Systems on the Paglia River,’ proposed by the Central Apennine Basin Authority (AUBAC). The contents of the Project Report, the tools and participatory events carried out in the area (in the municipalities of Acquapendente, Allerona, Castel Viscardo, Orvieto and Proceno), read as an exercise in “civic” ethnography, reveal interesting aspects. They reveal how central institutions “reason” and operate in defining territorial intervention policies and strategies and how the participatory involvement of local administrations and communities is interpreted.

Among the ‘side effects,’ the Public Debate led to the mobilisation, demonstration, and progressive self-organisation of ecological sensibilities widespread in local communities. In this case, “civic” ethnography focused on the regeneration of networks based on personal relationships, the gradual involvement of local associations, the more or less explicit synergy with public authorities governing the territory and local administrations, and signature collection and awareness-raising campaigns.

In a nutshell, by interpreting the territorial planning mandate in a reductionist manner, emphasising the issue of preventing the risk of possible flooding, and based on a cost-benefit analysis and justifying the exclusive use of hydraulic engineering solutions, AUBAC represented the Paglia River as a danger to be tamed.

The Paglia Community civic organisations have highlighted every aspect of the river ecosystem and its unique characteristics, emphasising the complexity of the relationship between the physical environment and human settlements, and emphasising its identity and fragility. The river is a common good that must be protected.

In short, the symbolic device produced in the first case is concerned with defending human settlements “from” the river; in the second case, it is concerned with defending “the” river from interventions that compromise its balance.

These are two very different visions of the “Paglia issue,” fuelled by arguments that make it impossible to classify one as the result of knowledge and the other as the product of belief. In this context, the tools of public debate and the attitude taken by AUBAC staff have made them oppositional, and “Sistemi di Invasi sul Fiume Paglia” has

turned out to be a top-down project, with an approximate knowledge of the territory, a reductionist engineering approach, outdated and disrespectful of Do No Significant Harm, alien to Nature Based Solutions, inclined towards extractive economics, and denying the Community Based Approach. A case of internal colonialism.

Water Crisis and Water Grabbing in Basilicata

Presenting author

Federico Schirchio
(Post doctoral researcher, University of Milan, Italy)

ABSTRACT

Despite its abundance of water resources, Basilicata has recently experienced a severe water crisis that left more than 140,000 people across 29 municipalities subject to rationing. This paradox—an ostensibly water-rich region forced to ration—reveals deep structural causes. On the one hand, climate change and drought contributed to the emergency, drying up reservoirs such as the Camastra dam; on the other, decades of inefficient management and short-sighted policies have produced extremely high distribution losses (over 65% of water introduced into the network is lost) and obsolete infrastructure. Neoliberal governance choices have further exacerbated the problem: in 2024 the management of Lucanian dams was transferred to a new mixed-ownership company, Acque del Sud S.p.A., whose share capital may be sold to private actors up to 30%. This partial privatization—openly at odds with the outcome of the 2011 referendum in which Italians reaffirmed that water is a public good—has sparked criticism about the commodification of water. Basilicata thus emerges as a "sacrifice zone," where local resources are exploited for externally oriented projects without real benefits for communities, following an extractivist development model reminiscent of neo-colonial logics: localized impoverishment, profits concentrated elsewhere, and the marginalization of residents.

Using the analytical categories of political ecology, the Lucanian water crisis represents a socio-environmental conflict in which the intersection of climatic disruption and political inefficiency is starkly evident—a case of water grabbing in which state institutions effectively abandon the territory, leaving it vulnerable to private interests at the expense of local populations. To grasp this dynamic, the concept of hydro-hegemony as elaborated in the works of Erik Swyngedouw and Filippo Menga will be employed.

This approach situates the analysis within the broader political-ecology debate, critiquing neoliberal logics of environmental governance and showing how the transformation of water from a common good into a commodity generates inequalities and social tensions. Since the late 1990s, environmental-justice movements responding to these dynamics have challenged dominant development paradigms and technocratic narratives in environmental governance. Finally, the perspectives of environmental justice and political ecology converge in advocating alternative models of participatory and democratic water management. In Basilicata, this is evident in citizen mobilizations that reclaim water as a common good and oppose privatization, foregrounding the role of local communities and situated knowledge in political decision-making.

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Hydro-politics narratives in Italy: Reframing Water Governance through Socio Hydrology and Ethics

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ABSTRACT

Theoretical framework

Water is a non-replaceable and non-substitutable resource, biologically required for humans and most other non-human species. However, its definition, meaning and (ethical) values vary among different subjects; as a result, it is necessary to consider water not only as an entity of biophysical nature (H_2O), but also as a «process» (Linton, 2010).

Water scarcity and abundance, the climate crisis – often characterized as a hydro-climatic change (Dell'Angelo et al. 2016) – the neoliberal approach to the distribution of natural and socioeconomic resources, have all had a significant impact on water governance both locally and globally (Gupta et. al. 2013).

Regarding the European Union, the National Recovery and Resilience Plan (PNRR) and National Plan for Adaptation to Climate Change (PNACC) in Italy serve as illustrative examples of a technocratic approach to water governance issues, without truly including the intersectional meanings of water(s).

In the context of water governance, theoretically framed as a «social function» (Pahl-Wostl 2019), it is imperative to delve into the complexities of its multifaceted nature. Water governance cannot be confined to a mere technical and institutional framework (Postel 2008).

Methodology

The concepts of socio-hydrology (Sivapalan et al., 2012; Pande and Sivapalan, 2017) and socio-hydrogeology (Re, 2015; Hynds et al., 2018) are illustrative of the bridge between the technical management of water resources and socio-cultural frames. In this respect, the hydro-social cycle serves as the main theoretical framework (Linton and Budds, 2014).

I would like to present a qualitative, document-based methodology as the basis of the study. This analysis could include: Discourse study of Italian National strategy and policy papers (River Basin Management Plans, PNRR and PNACC); Examination of institutional and legal documents in the Italian and in the European Context (considering both the Water Framework Directive and 2025 European Water Resilience Strategy; Examination of re-municipalisation and water re-commoning in Italy).

Original theory

This proposal integrates ethical-political theory with socio-hydrosocial analysis, showing how dominant hydro-political narratives do not reflect commitments to justice, common-based governance, and ecological interdependence. In the era of climate crisis, Ostrom's design principle for natural resource management of common-pool resources should be internationally and locally endorsed to reach a more sustainable governance of water resources.

Type of analysis

Policy and institutional discourse analysis uncovers dominant narratives ("emergency," "modernization" and "efficiency") that legitimize current water governance models.

A second layer of analysis examines whether and how these narratives accommodate or inhibit principles such as: Water as common good (Ostrom 1990); Participatory governance; Ethical and ecological responsibility.

Conclusions

The analysis of Italian hydro-political discourse emphasises the need for a more inclusive and ethically grounded approach to national water governance. This approach must be attentive to territorial equity, plural knowledge systems, and long-term sustainability. The Italian case study offers a more comprehensive understanding of Euro-Mediterranean water politics in the context of climate change and democratic decline, also considering the Italian water movement tradition attentive to communitarian and local governance of water (see the 2011 Referendum).

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The internal geopolitics of water scarcity: supply-side policies trump demand-side management in Spain

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ABSTRACT

Water management in water-scarce countries can generate or exacerbate conflicts. Said conflicts tend to exhibit geographically differentiated narratives which are shaped by the socioeconomic and ideological profiles of key actors. This paper examines how disputes over water allocation intensify territorial tensions using the Spanish case as illustrative of how national and regional political discourses shape public perceptions of water management. It also evaluates public support for both supply-side policies aimed at increasing water availability and demand-side measures that seek to limit water consumption. The analysis combines an internal geopolitical approach—focusing on power relations among actors across multiple scales in Spain—with both the results from a survey developed based on the theory of planned behaviour and insights from semi-structured elite interviews.

From the 1990s onwards, Spain's historical model based on large-scale hydraulic infrastructures faced significant challenges due to regional water imbalances, increasingly frequent droughts, shifting environmental priorities in the EU, and political decentralisation. At the national level, conservative actors advocate for expanding infrastructure to maintain water supply and productivity through market-oriented mechanisms, while left-wing actors emphasise demand reduction, environmental sustainability, and structural transformations in key sectors such as agriculture and tourism, explicitly opposing water commodification. At the regional scale however, Mediterranean regions in Spain, characterised by structural water scarcity, invoke identity-based arguments to support water transfers, whereas inland regions emphasise territorial sovereignty and resource protection. These dynamics are increasingly politicised, especially during elections, preventing the development of a unified national water policy. These tensions occur within a broader European context marked by growing political polarisation and the erosion of the environmental consensus that led to the adoption of the European Green Deal in 2019.

The results of the analysis indicate that in Spain polarisation has intensified due to ideological narratives and misinformation disseminated via social media (Salinas et al. 2025). On the other hand, a regionally segmented survey conducted by Tirado Sarti et al. (2025) reveals that despite widespread public concern about future water availability, willingness to accept concrete sustainability measures remains limited. Although the

environmental dimension is gradually gaining recognition the productive value of water continues to be prioritised.

Specifically, there is a clear social preference for increasing water supply, reflected in high acceptance of regenerated and or desalinated water primarily for non-potable uses rather than adopting demand-side measures such as tariff adjustments or reducing water consumption by the agricultural sector. These preferences are strongly influenced by both ideological and territorial factors.

This analysis underscores the internal geopolitical dimension of water management, demonstrating how political and territorial discourses can influence public perceptions. Understanding how these perceptions shape social acceptance of water policies is essential for advancing sustainable and politically viable solutions to water scarcity. Spain furthermore serves as a paradigmatic case for anticipating the challenges other European and southern Mediterranean countries are likely to face.

7. PANEL 2 – IDEOLOGY & NATIONALISM IN EURO-MED WATER SECURITY

MODERATORS

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Mega Dams, Canals, and Pipelines: water as part of large geopolitical chess games

Presenting author

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ABSTRACT

The management of transboundary rivers is fundamentally shaped by geopolitical and geo-economical dynamics, transforming water into a strategic asset and a tool of diplomatic leverage. This is vividly illustrated by three critical hot spots. Ethiopia's mega hydropower dam on the Nile, which has recalibrated regional power and introduced transactional elements like cryptocurrency mining. Afghanistan's Qush Tepa Canal, which pressures long-lasting water uses in the strategically vital region of Central Asia. The expansion of oil and gas fields in Iraq and Iran, which is causing severe environmental degradation in the Mesopotamian Marshes. Water is not merely managed but weaponized, with significant socio-environmental costs often justified by high political and diplomatic payoffs. Ultimately, in a rapidly shifting global order, water itself has become a transactional tool and a central currency of power.

Cooperation on the large dams on transboundary rivers in Ethiopia: Towards achieving a win-win balance between upstream hydropower generation and downstream water demand under climate change.

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ABSTRACT

Transboundary river management is critical for international relations, sustainable energy development, and ecosystem management. Hydropower development, while meeting downstream water demand, is crucial for cooperation among countries sharing water resources. However, addressing this challenge under the context of climate change poses significant complexities. This study investigates the cooperation regarding hydropower production and water releases under the potential impact of climate change. We project future streamflow using the calibrated HBV hydrological model in three transboundary rivers originating from Ethiopia: The Upper Blue Nile (UBN), Omo, and Tekeze rivers. Subsequently, we compute the maximum hydropower energy by optimizing water release policies using the adapted 'Reservoir' R package. The hydropower potential and water release are analyzed for three dams on transboundary rivers: the Grand Ethiopian Renaissance Dam GERD, Omo-Gibe III, and Tekeze dams, based on 11 scenarios of water releases ranging from those favouring the upstream country (Scenario 1) to those benefiting downstream countries (Scenario 11). Our focus lies in identifying the cooperation ranges required within this scenario spectrum. The findings indicate that within an appropriate range for the minimum monthly water release threshold, the hydropower potential for the three study sites only has a small decrease, while the water release to downstream, especially for the driest month, can be 1.14-2.13 times larger compared to no water release constraints. We identified that 30%-50% of the historical monthly flow as the minimum water release threshold is expected to define the cooperation range during the historical period for both the GERD and Omo-Gibe III. Due to climate change, the cooperation range for GERD is projected to decrease to 10-20% in future periods, whereas no significant impact is expected for Tekeze. The study reveals that future energy production in GERD may decrease with increasing the minimum water release threshold, underscoring the need for adaptive

cooperative strategies for both upstream and downstream countries in the face of climate change.

Official Water Narrative in Morocco (national discourse, drought vs. agri-policy blind spots)

Presenting author

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ABSTRACT

The water crisis in Morocco has gained more attention in public debate as well as in the press and among professionals and academics. Water scarcity and overexploitation of aquifers led to severe water deficit and socio-economic instability, including livelihood losses, rural exodus, and overall decline of economic growth. Agriculture accounts for approximately 86% of total water consumption, yet the dominant narrative continues to frame the water crisis primarily as a consequence of drought and hydrological shortfalls. As a result, institutional responses tend to prioritize supply-side interventions such as dam construction and desalination. While official reports acknowledge the importance of improved water management in agriculture, they often overlook the structural role of agricultural policies in exacerbating water scarcity. To elucidate this discursive gap, we conducted a text mining analysis of content published on the websites of Morocco's two main state media outlets (Aloula and 2M). In TV news, the narrative focuses on reporting rainfall events and assuming great impact on aquifer recharge and agricultural sector. In debate and discussion, invited experts focus on providing figures to explain hydrological deficit, rate of dam storage, overexploitation and carry out comparisons between different watersheds. In addition, new desalination plants are highlighted as a technical fix of water scarcity. However, less emphasis is given to drivers of aquifer depletion: agricultural policies. Why does the official narrative marginalise the principal driver of the water crisis? Our investigation situates these findings within broader debates on water governance and management, where the interplay between discourse, policy, and institutional priorities plays a critical role in shaping responses to water scarcity. As the government encourages agricultural intensification through financial and administrative incentives (e.g Green Morocco Plan), it ignores socio-ecological vulnerabilities and climate change impact in the design of agricultural development policies and programmes. Water resources monitoring indicates that agricultural intensification goes with increasing water demand and depletion of existing scarce resources in different regions (e.g Souss watershed). Therefore, the physical water shortage is worsened by agricultural development policies.

Urban Political Ecology of Water Scarcity in Istanbul (discursive production, infrastructural politics)

Presenting author

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ABSTRACT

My research explores the discursive production of water scarcity and its framings in relation to infrastructural development in Istanbul. I examine the underlying dimensions, such as developmentalist notions and urban-centric priorities, as well as water scarcity, which justify infrastructural developments. Additionally, I explore the real impacts of these infrastructural developments on everyday water (in)security. To explore these research questions, I will utilize the lens of urban political ecology (UPE). UPE is particularly suitable for this research as it politicises water scarcity and development and unravels the power dynamics of water scarcity and infrastructural development (Heynen et al., 2006; Swyngedouw, 2009).

Istanbul is a suitable case to study these research objectives. That is because with the exceptions of some research (Harris, 2008; Harris & Alatout, 2010; Islar & Boda, 2014) the majority of studies on water scarcity and infrastructure projects in Istanbul are from an apolitical point of view. In Turkey, as elsewhere, water scarcity and infrastructural development are deeply intertwined with power dynamics, politics, and contested imaginaries. Yet these dimensions are often overlooked in literature, highlighting the need for research on water scarcity in Turkey from a UPE perspective. Adopting a UPE lens allows me to interrogate whose needs and benefits are prioritised in state-led infrastructural development, how these priorities are justified, and how they are discursively framed. This research thereby contributes to advanced debates on the politics of water (in)security in Istanbul and to the UPE scholarship on the entanglement of infrastructure, power, and everyday life. In doing so, I plan to conduct interviews with various stakeholders, make observations, and participate in participatory observations, as well as conduct a policy and discourse analysis.

Turkey, as a country in the Mediterranean region, will serve as a suitable case study to include in this workshop. In this workshop, I aim to outline and raise questions about how politicians communicate water issues and examine the narratives shaping water policies and national hydropolitics. Comparing Turkey with other countries in the Mediterranean region will enhance my understanding of water politics, as well as that of other participants.

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The hydrosocial cycle in Thessaloniki, Greece: Water Institutions, Hydropolitics and Resistance

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ABSTRACT

Theoretical Framework
This contribution engages with debates on European and Mediterranean hydropolitics, drawing on approaches from political ecology and the hydrosocial cycle (Swyngedouw, Kaïka, Castro, 2002). The central assumption is that water is not a neutral resource but rather a field of negotiation among institutions, civil society, economic actors, and nation-states. Analyses of water politics in the aftermath of the debt crisis (Bieler & Jordan 2018; Geagea et al. 2024) highlight the oscillations between pressures for privatization, processes of re-municipalization, and emerging forms of "re-commoning." Water governance is shaped by the interplay between processes of nation-building, the politicization of public services, and adapting to EU policies (Water Framework Directive 2000/60/EC, Floods Directive 2007/60/EC). The recent judgment of the Court of Justice of the EU (C-359/24, 2025), which condemned Greece for failing to update its flood risk management plans, underscores the political salience of the issue.

Methodology
The research combines desk research with empirical fieldwork carried out during a scientific mobility period in Thessaloniki (2025), in collaboration with Aristotle University and IAWD. Institutional sources (Ministry of Environment, river basin management plans, EU documents), scientific literature (Kaïka 2003; Bieler & Jordan 2018; Geagea et al. 2023, 2024, 2025), and case studies of water utilities (in particular EYATH in Thessaloniki) were analyzed. In parallel, semi-structured interviews were conducted with institutional actors (public water utilities, regional authorities, and the technical chamber of commerce of Thessaloniki), academics, and non-profit organizations active on water in Greece and North Macedonia, with the aim of mapping governance relationships, with particular emphasis on issues of floods.

Original Material
The contribution presents results from an online survey addressed to organizations working on water in Greece, focusing on drainage, flood response, and climate adaptation, which highlights common challenges such as fragmented competences, difficulties in inter-institutional coordination, and financial pressures. Together with a stakeholder mapping in the Greek context, with particular attention to the role of EYATH and decentralized administrations.

Type of Analysis

The analysis is comparative and multi-level: at the local scale, it examines water management in Thessaloniki and its relations with other water authorities; at the national scale, it considers Greece's implementation of the Water Framework Directive and flood planning.

Conclusions

The contribution shows how water constitutes a crucial arena of hydropolitics and socio-hydrology in Greece. The two major Greek utilities (EYDAP in Athens and EYATH in Thessaloniki emerge as emblematically resilient institutions: shaped by the mass mobilization of citizens and employees who campaigned against their privatization, they now face increasing pressure from climate change; in this context, national and supranational politics play somewhat ambiguous roles. The research points to three lines of reflection:

- Strengthening mechanisms of inter-institutional coordination among utilities, regional authorities, and national water governance bodies.
- Mainstreaming climate adaptation into water planning (resilient infrastructure, leakage reduction, flood risk management).
- Considering ideological and nationalist dimensions as factors shaping water policies beyond purely technical aspects.

In this sense, the Greek and Balkan cases shed light on the second theme of the call — nationalism, ideology, and water security — while providing comparative insights for the broader Euro-Mediterranean debate.

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Valle di Lei Dam: Envirotechnical Politics Swiss Italian concession conflict

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ABSTRACT

Original empirical material
The Valle di Lei dam represents a peculiar case in the European context: a Swiss infrastructure exploiting a reservoir located on Italian territory, managed by KHR (80% Swiss, 20% Edison). On the Swiss side, the corporate structure is diversified: alongside private actors, the City of Zurich, the Canton of Grisons, and several municipalities take part, reflecting a rooted model of shared hydropower governance. This configuration stands in stark contrast to the Italian side, where the municipalities of the Valle di Lei remain excluded from decision-making processes and rely solely on modest royalties. These revenues, though marginal when compared to the profits redistributed across the border, are nonetheless vital for ensuring essential services in the depopulated mountain areas of the Province of Sondrio. With the concession set to expire in 2042, the prospect of Heimfall (the free re-municipalisation of the infrastructure in favor of Swiss entities) risks further deepening this imbalance. Yet, the recent Lombardy legislation on concessions has opened, at least potentially, new opportunities for processes of re territorialisation of value.

Theoretical framework
Adopting the lens of Urban Political Ecology (see Tzaninis et al., 2023 for a recent perspective; and Heynen et al., 2006 for an earlier formulation), this contribution asks who gains and who pays within the territorial formulations of envirotechnical system. The case of the Valle di Lei is interpreted as an envirotechnical system sustained by an envirotechnical regime (Pritchard, 2011), highlighting how it is neither purely technical nor simply natural, but rather a territorial instrument of accumulation. A device capable of consolidating spatial hierarchies and models of value distribution, which intersect with practices and policies of land use and water governance.

Methodology
This contribution is part of a broader doctoral research project that adopts a mixed-methods approach. Here, however, the focus is placed on specific tools: the historical analysis of concessions, the collection and examination of economic data related to fees, transfers, and generated surpluses, the mapping of institutional and non-institutional actors, and the reconstruction of the conflictual geographies surrounding the attribution of value. To this, in the current phase, semi-structured interviews and fieldwork are added, which help to capture the materiality of the relationships that animate the Valle di Lei system.

Type of analysis

The envirotechnical regime of the Valle di Lei highlights:

- the profound asymmetries of power and value between the two sides of the same valley.
- the capacity of concessionary regimes to transform water into a rent-bearing asset, with surpluses territorialised unevenly as a result of different practices and policies.
- the hydroelectric surplus as a crucial node of distributive conflict.
- how the envirotechnical system of the Valle di Lei is changing in light of Switzerland's decision to phase out nuclear power by 2050 and the policies of the Canton of Grisons, which aim to re-municipalise expiring concessions.
- a new Italian scenario opened by the Lombardy regional law of 2020.
- the historical fragility of the Italian model, which has long been unable to ensure a genuine territorial return of the resources generated.

Conclusions

Policies that intertwine water and energy cannot be understood without a precise reading of the processes of value territorialisation and the distributive fractures they generate. Narratives and policies of the energy transition risk, once again, concealing the reproduction of water peripheries, the outcome of dynamics of extraction and the relocation elsewhere of the value produced.

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8. PANEL 3 – AGRICULTURE, IRRIGATION & FOOD TRADE: VIRTUAL WATER & WATER-FOOD SECURITY

MODERATORS

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Global connections and collaborative solutions for sustainable water security – insights from the GloWater project

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ABSTRACT

The world is facing a dual water crisis of sustainability and security. While the current governance mechanisms have enabled the utilization of water on a global scale for remarkable societal good, they have failed in keeping freshwater disturbance within the limits of safe and just Earth system boundaries. This has led to drastic social and economic implications and a rise in water-related conflicts, calling for new perspectives and solutions. GloWater offers novel ways to understand, operationalize and promote sustainable water security and its governance. We approach water as a global, social-hydrological system, where Finland and Finnish actors are globally connected via the hydrological cycle, international relations and water-intensive consumption, production, and trade. Our work is guided by three main research questions: 1) What are the key characteristics of sustainable water security and its governance? 2) How do Finland and Finnish actors affect and are affected by changing global water security conditions? 3) How can different governance mechanisms and collaborative solutions, such as corporate water stewardship or water diplomacy, enhance sustainable water security, in Finland and globally? First findings on the research questions will be shared, with invitation to reflect on their generalizability and the replicability of the project's approach in other contexts.

Ecological justice and virtual water trade dynamics in the food sector: States and large agro-food enterprises

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(Principal researcher, University of Turin, Italy)

ABSTRACT

Global dynamics related to the virtual water (VW) associated to food trade are presented in this work, considering first the layer of trade among States, and then the large agro-food enterprises layer. The VW trade associated to food is composed by the quantity of water utilized for the production of the crops exchanged on the global market. In assessing a country's water abundance or scarcity when entering the international VW trade, scholars consider only physical water availability, neglecting economic water scarcity, which indicates situations in which socio-economic obstacles impede the productive use of water. We weight the global VW trade associated to primary crops with a newly proposed composite water scarcity index (CWSI) that combines physical and economic water scarcity. 39% of VW volumes is exported from countries with a higher CWSI than the one of the destination country. Such unfair routes occur both from low- to high-income countries and among low- and middle-income countries themselves. High-income countries have a predominant role in import of CWSI-weighted VW, while low- and middle-income countries dominate among the largest CWSI-weighted VW exporters. For many of them economic water scarcity dominates over physical scarcity. The application of the CWSI also elicits a status change from net exporter to net importer for some wealthy countries and *viceversa* for some low- and middle-income countries. Subsequently we investigate the influence of major food corporations on global rice and coffee markets from 2013 to 2022, with a focus on market presence and water usage. We use detailed data to analyze environmental impacts and virtual water flows at the company level, addressing gaps in the existing literature. Key findings show that although rice sales are larger than those of coffee in quantity, coffee embeds a higher total water use due to its greater unit water footprint (WF). The rice market is less internationalized and concentrated compared to the coffee market, where a few companies hold significant market shares across multiple countries. The top 12 rice-selling companies control 16% of the global rice WF, exceeding the combined WF of the top three rice-importing nations. Similarly, the top 15 coffee-selling companies command 55% of the global roasted coffee WF, with significant disparities in VW quantities compared to major importing nations. The coffee market exhibits a higher number of companies with larger shares of WF than volumes, with this disparity increasing over time. These findings highlight the considerable concentration of water resources among large companies, particularly in the coffee sector. The research emphasizes the importance of considering the environmental implications of corporate activities in food supply chains, providing valuable insights for sustainability efforts in the agri-food industry.

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The ‘return’ of water grabbing?

Presenting author

Jampel Dell’Angelo
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ABSTRACT

The ‘return’ of water grabbing?. Inspired by the movie ‘The return of the living dead’ I discuss what happened to the conceptualization of water grabbing and where we stand compared to 10 years ago, in terms of academic discussion, policy relevance and real-world impacts. I argue that water grabbing changes its shapes and prey, accumulating profit and producing, in the words of Duncan (2021) waterborne terror, a dynamic that can be well understood through a necro-hydrological perspective. (extended abstract expected by 31st of October).

Virtual Water and Transboundary Cooperation

Presenting author

Melvin Woodhouse
(Senior International Development Officer, Hutton Institute, UK)

ABSTRACT

Tony Allan asked whether virtual water was something more than an intellectual project, hopefully it is but we have yet to see countries exploring agreements over their VW trade – or indeed cooperating bilaterally around this virtual transboundary shared water.

But what might the purpose of such cooperation be, what shape might it take, would there be principles involved and what would be the expected outcomes? The UK for example imports 45% of the fresh veg and over 90% of the fruit it eats – whilst meanwhile those exporting partners are experiencing the impacts of climate change and their behaviour towards using water for export food production is changing. Virtual water trade clearly underpins our present basis of food security, but this is being destabilised by climate change and the consequent behaviour changes of the growers.

We are well aware of the benefits of countries cooperating over shared rivers and aquifers – and that process has often begun through practical scientific exchanges, data sharing, and joint programmes of work. It seems fairly easy to envisage what scientific cooperation over shared virtual water might encompass across its volumetric analysis to sharing water management, agritech and horticultural knowledge and skills. Its benefits would be in a better understanding of how this water trade works, what is likely to change and most likely sharing expertise in plant and water science to conserve water use.

But is there merit in thinking there is a purpose in cooperating further? What trajectory might that cooperation take over the short and medium term and what benefits might justify such action? As there is no physical linkage in virtual water which would demand joint responsibility for its management is it pointless for two countries to work together on their virtual management?

Potentially this further cooperation might speak to enabling dynamic trade agreements which facilitate change by growers and importers, whilst an understanding of how exporters behaviour will be changing may yield opportunities for both exporter and importer. Inevitably it would take an interest in the role of the major supply chains and the role of the supermarkets which supply the majority of food in many countries – where in the UK for example 8 out of every £10 spent on food goes to the supermarkets.

At the same time, the private sector has not been slow in responding to climate impacts on “historic” producer countries and are investing in relocating production globally and building new supply chains internationally. This potentially may have a direct impact on present day international food markets and see private sector control increase.

So, are there positive sum outcomes to be found in virtual water cooperation and how can these be found and brought to the fore? If cooperation on shared Virtual Water is to be explored beyond “scientific” partnerships, then understanding what it would seek to achieve becomes a prerequisite to justify its pursuit.

Sustainable crop production and the dilemma of agricultural intensification

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Presenting author

Maria Cristina Rulli (Full professor of Hydrology, Politecnico di Milano, Italy)

ABSTRACT

Solutions to feed the planet often point to agricultural intensification (i.e., increase in crop yields) as the approach that could meet the increasing human demand with the smaller environmental impacts. Indeed, intensification avoids the land use change (e.g., deforestation), habitat destruction, and increase in CO2 emissions that would result from an expansion of cultivated land (or "extensification"). The impacts of intensification on freshwater resources, rural livelihoods, and equity, however, is often ignored. At the same time, agricultural expansion has important externalities that go beyond biodiversity losses or greenhouse gas emissions, with important ramifications to human and planetary health. We use a suite of model simulations and data analyses to evaluate the hydrological and nutritional impacts of agricultural intensification vs expansion and discuss their different suitability for large scale farming vs smallholders.

9. PANEL 4 – COMMUNICATING WATER: MEDIA, POLITICS & SCIENCE-POLICY INTERFACE

MODERATOR
Emanuele Bompan (Director of Renewable Matter, Italy)

Communicating water in Italy

Presenting author

Emanulele Bompan
(Director of RenewableMatter, Italy)

ABSTRACT

in progress

Policy dialogue in dryland agriculture projects in Iran, Tunisia, India

Presenting author

Bryan Chatterton
(Former Ministry of Water, Australia)

ABSTRACT

Objective
To develop a program to reduce water consumed by irrigation and still maintain food production.

Background
Iran has a water crisis at two levels. There is the current crisis caused by drought and the longer term crisis due to the over pumping of aquifers. Consumption of water for irrigation needs to be reduced to a sustainable level while maintaining food production. Irrigation is the major consumer of water through evaporation and transpiration (ET). Consumption is not the total amount of water applied to the crops. That is dependent on the irrigation method. Where more water is applied by flood irrigation for example than required by the plants the surplus is return flow which recharges the aquifer or returns to the river..

The conventional approach
The wells in Iran are not registered and the volume extracted is not known. The irrigation water provided by dams is not measured at the farm level to the degree of accuracy required for any water pricing or tax. To change this is not politically feasible.

The conventional approach has been to either regulate the water or price it. Regulating the water at the level of an individual farm is complex and has proved to be beyond the capacity of a bureaucratic system. Pricing the water imposes an extra cost on farmers which in turn will be passed on the consumers in the form of food price inflation. That is not politically desirable either. The price mechanism is also a clumsy means of making irrigation more effective. Measuring the water volume is different from measuring the ET. A likely reaction by farmers would be to stop growing sugar beet which grows through the hot summer months and requires considerable irrigation. Some reduction may be desirable but in an organised manner.

Excess water use
This is not about drip irrigation. While drip can save some water consumption in the form of evaporation and transpiration (ET) the major savings are achieved by growing crops in a different manner so they utilise more of the rainfall and mature before the hottest months of the summer. This has to be done on a local basis – both in terms of the water resources and the crops grown.

For example, a farmer near Shiraz managed to reduce his irrigation for a wheat crop by 20% through early sowing. This meant the wheat utilised more of the rainfall (300 mm in the Shiraz area) and matured before the hottest months. To achieve this he needed to

achieve rapid and effective weed control in the autumn. Planting the wheat a month early is just one example of many farming changes which will reduce the pressure on the water resource.

Alternative policies

This proposal turns the conventional approach on its head. Instead of trying to price the use of water it tries to incentivise the non use of water. Instead of a tax on all the water the farmer uses there is a bonus paid for the water (as ET) he does not use. It is not a grand plan to solve the Iranian water crisis but hundreds of actions based on local water resources and farming methods.

Implementation

Demonstration farms.

These are commercial farms that have already achieved savings. They will provide a model for other farmers that is more powerful than research centres which have an abundance of resources. Each demonstration farm will have a group of farmers linked to it in a “Know your neighbour” program.

Funding

It was stated above that water charges were politically impossible due to fierce opposition by farmers to the metering of wells. Funding the non use of water cannot be based on a precise payment per cubic metre for this reason. Instead the payment would be in the form of a prize. Identifying the farms would be achieved by satellite.

Prestige

It is important that the farmers who reduce water consumption not only become mentors in the demonstration farm program but receive recognition for their expertise in the form of an award as an Expert Water Manager.

Additional water resources

Iran currently does not utilise its rainfall resources to the extent that is possible within the constraint of sustainability. This is the subject of a second paper.

Biodiversity, water, and political communication

Presenting author

Stuart Orr
(President of International River Foundation and former WWF International Head of Freshwater, Australia)

ABSTRACT

in progress

Communicating Water, Water Policy Dialogue

Presenting author

Gaia Proietti
(PhD candidate, University for Foreigners of Perugia, Italy)

ABSTRACT

Theoretical framework
As evidence does not speak for itself, it must be communicated, and this is the case for water science. Traditionally, it has been assumed that where clean, affordable water flows predictably from the faucet, the public does not give water much consideration, and the "science communication problem" (Kahan) does not occur, at least in relatively water-rich regions. Nevertheless, climate change, environmental inequalities, and subpopulations of stakeholders can influence public perspective with a direct consequence on the Science-Policy dialogue. This study is situated within the interdisciplinary fields of Environmental Communication, Science and Technology Studies (STS), and Science Diplomacy. It relies on theories of framing, boundary objects, and the science-policy-media interface, focusing on how knowledge about water is produced, communicated, and negotiated across sectors. The concept of water diplomacy is employed not as an abstract ideal but as a practical tool for increasing the visibility, credibility, and usability of scientific knowledge within national and transnational water governance frameworks.

Methodology
This study primarily employs a qualitative, comparative approach grounded in discourse and reports analysis. It examines how water is communicated in three different domains: scientific reports (e.g., IPCC, UNESCO – WWDR and IHP), political speeches and legislative texts (Italian water directives, policy papers), and media narratives (international press and digital platforms). Moreover, some remarkable case studies, such as transboundary water cooperation in the Nile River and the Mekong region, will be analysed to demonstrate how water diplomacy can support better communication strategies and policy alignment.

Original Material or Theory
This study proposes the Water Communication Triad as a conceptual framework to explore the different but interconnected roles of science, politics, and media in shaping public discourse on water. This concept is explained as follows: water as a resource being under stress (science), as a political priority (politics), and as a drama or crisis (media). The research claims that while these framings are not inherently contradictory, their misalignment is likely to reduce the impact of scientific evidence on policy and public understanding. Within this framework, water diplomacy is presented as a strategic mechanism capable of bridging communicative gaps and promoting mutual trust, especially through joint knowledge production, diplomatic networks, and co-framing processes.

Type of Analysis

The study combines critical discourse analysis with the concepts of framing and actor-network theory (ANT). Its main goal is to investigate how scientific language is used in political discourses and news narratives, and how the presence or lack of water diplomacy mechanisms influences the coherence and continuity of communication concerning water challenges.

Conclusions

The study concludes that water communication is still partly fragmented across institutional domains. Scientific knowledge, although highly relevant, often remains confined to expert circles; political discourse often simplifies or instrumentalises water issues for short-term agendas, while media narratives tend to focus on emergencies. In this framework, water diplomacy can function as an enabling mechanism, promoting not only international cooperation but also clearer, more coherent, and impactful communication about water. By facilitating dialogue, transparency, and shared understanding, water diplomacy contributes to strengthening the Water Communication Triad, ultimately improving the quality and legitimacy of water governance.

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Journalists-researchers collaboration for transformative communication in water conflicts: lessons from the Nile

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Presenting author

Emanuele Fantini
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ABSTRACT

This presentation is based on a seven-year-long transdisciplinary collaboration between researchers, journalists, and photographers from different Nile basin countries. In this workshop, I will share our reflections on the aesthetic experience of picturing and watching waters, as well as on its effects in terms of emotions and meanings associated with the Nile river. In doing so, I wish to highlight how the visual can contribute to promote empathy with and through waters, as well as a culture of dialogue, respect, and relations building across international rivers like the Nile.

Water data design, IPCC negotiation, and data design

Presenting author

Angela Morelli
(CEO, InfoDesignLab, Norway)

ABSTRACT

in progress

Hydrology in the Climate Age: Bridging Data Gaps for Resilience

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Presenting author

Yvette Ramos
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ABSTRACT

Introduction
Access to reliable hydrological data is critical for understanding climate-driven changes in water cycles. Yet, in many regions—especially the Global South—monitoring networks are sparse, fragmented, or outdated. This paper explores how data limitations hinder modeling, forecasting, and adaptive water management. It highlights the urgency of investing in open, interoperable hydrological data systems to inform policy, protect ecosystems, and ensure water security under accelerating climate stress.

Theoretical Framework: This paper draws on the intersection of climate science, hydrology, and science-policy communication. It is grounded in the understanding that water is not only a technical resource but also a socio-political and emotional one. The framework integrates theories of environmental governance, data justice, and knowledge co-production, emphasizing that effective climate adaptation in water management depends on both robust data systems and inclusive dialogue across scientific, political, and public domains.

Methodology
The study employs a qualitative, multi-source approach. It synthesizes literature on hydrological monitoring, climate adaptation, and science-policy interfaces, with a focus on the Global South. Semi-structured interviews with hydrologists, policymakers, and media professionals complement the desk review. Case studies from Sub-Saharan Africa and Southeast Asia illustrate how data gaps manifest in practice and how different actors communicate water-related risks and solutions.

Original Material or Theory: This work introduces the concept of "hydro-communication asymmetry," referring to the disconnect between the technical complexity of hydrological data and the simplified narratives used by politicians and media. It argues that this asymmetry contributes to misaligned priorities, underinvestment in monitoring infrastructure, and limited public understanding of water-related climate risks. The paper also proposes a typology of water communication styles across scientific, political, and media domains, highlighting their respective strengths and limitations.

Type of Analysis
The analysis is thematic and comparative. It examines how hydrological data is generated, interpreted, and communicated across different actor groups. It evaluates the effectiveness of current science-policy dialogues, using criteria such as accessibility, feedback mechanisms, and institutional support. The study also maps existing data gaps in hydrological monitoring and assesses their implications for climate resilience, particularly in vulnerable regions.

Conclusions

Reliable hydrological data is foundational for climate-resilient water management, yet many regions lack the infrastructure, coordination, and political will to sustain effective monitoring systems. The disconnect between scientific data and public discourse—what this paper terms hydro-communication asymmetry—undermines informed decision-making. Bridging this gap requires investment not only in open, interoperable data systems but also in communication strategies that translate complexity into actionable insight. Strengthening science-policy-media collaboration is essential to ensure that hydrological knowledge informs policy, empowers communities, and supports equitable climate adaptation.

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10. PANEL 5 – GENDERED WATERS: WOMEN IN THE WATER SECTOR, MEN & MASCULINITIES

MODERATORS
Francesca Greco (Marie Sklowodska Curie Researcher, University of Bergamo, Italy)
Lesha Witmer (UNESCO Coalition for Gender and Water)

Insights from Routledge Handbook of Gender & Water Governance (global perspectives, new epistemologies)

Presenting author

Irene Leonardelli
(WAMU-NET Global Network of Water Museums, Italy)

ABSTRACT

Published in 2025, the Routledge Handbook of Gender and Water Governance brings together an exceptionally diverse collection of voices to critically interrogate the entanglements of gender, water, and power. Edited by Tatiana Acevedo-Guerrero, Lisa Bossenbroek, Irene Leonardelli, Margreet Zwarteveen, and Seema Kulkarni, the handbook is the outcome of years of joint research-activist work and collaborative teaching. Rather than curating a canon of established concepts or theories, the editors invited students, researchers, activists, practitioners, and journalists from around the world—many of whom they had learned alongside in prior projects—to contribute original perspectives. The result is a collection that, in the spirit of Ursula Le Guin (1988)'s "carrier bag theory of fiction," privileges multiplicity, receptivity, and sharing over linear narratives of progress.

The handbook builds on four decades of feminist water scholarship, which since the 1980s has exposed the gender-blindness of irrigation and drinking water schemes in the Global South. Early interventions revealed how women were systematically excluded from decision-making bodies, and how their daily water-related labour was ignored, leading to inequitable access, use, and control of water resources (see among others Shiva, 1988; Carney, 1998; Zwarteveen et al., 2012). Over time, feminist scholars have expanded their analysis beyond documenting inequalities, questioning instead the very logics of dominant water policies and development paradigms(see among others Ahlers & Zwarteveen, 2009; Harris, 2006, 2009; Ramamurthy, 1991; Sultana, 2009, 2011; Truelove, 2011; Ahmed & Zwarteveen, 2014). A broad and growing community—including ecofeminists, feminist political ecologists, and hydrofeminists—demonstrates how water governance is deeply gendered and racialized, shaped by neoliberal reforms, privatization, climate change, and biodiversity loss but also full of hopeful sparks of more careful, sustainable and equitable practices and relations (see among others Bossenbroek and Zwarteveen, 2015; Neimanis, 2016; Leonardelli et al., 2022; Acevedo-Guerrero, 2024).

Contributors to the handbook employ diverse methodologies—photovoice, life histories, storytelling, creative drawings, and participatory mapping, among others—to ground their analyses in the lived experiences of communities. Case studies presented in the different chapters range from gender mainstreaming in Indonesia's water governance, which reveals the persistent barriers posed by patriarchy and institutional fragmentation (Cole et al., 2025), to "care-full" critiques of sanitation infrastructure, which foreground embodied practices of hygiene and waste (Dombroski, 2025). Other chapters develop new theoretical imaginaries, such as post-human feminist analyses of agrarian transformations in India (Tozzi and Leonardelli, 2025), or decolonial feminist-queer-trans readings of water bodies in British Columbia that destabilize settler colonial land–water divides (Donald and Neimanis, 2025).

Organized into five sections—Positionality and embodied waters; Revisiting water debates; Sanitation stories; Precarious livelihoods; and New feminist futures—the handbook weaves together reflections on water justice, heritage, and care. Across these sections, recurring threads emerge: the need to recognize care and unpaid labour as central to water governance; the importance of emotional and embodied connections to water and the more-than-human world more in general; and the urgency of forging new epistemologies and practices in the face of climate change.

The volume's central message is that feminist engagements with water are not simply about including women in existing projects or adding a 'gender component. Instead, they open space for rethinking what counts as knowledge, who counts as an expert, and how waters themselves shape social worlds. Such insights, I believe, can help imagining more equitable and sustainable water futures also in Italy, Europe, and the Mediterranean region.

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Gender Dynamics & Masculinity in Water Sector (Italy & Euro-Med comparative matrix)

Presenting author

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ABSTRACT

Theoretical Framework
This research applies feminist political ecology and critical masculinity theory to study the involvement of women and men in Italian and European-Mediterranean water sector activities and their roles. Feminist political ecology foregrounds the role of gender in resource governance, situating water management as an inherently gendered practice that is often governed by patriarchal norms. This is complemented by the attention to critical masculinity studies to the degree to which hegemonic masculinities perpetuate male dominance in technical and decision-making positions in water organisations (Shrestha, G. et. al., 2019). It examines whether these gendered norms result in differences in participation and influence – in line with Integrated Water Resources Management (IWRM) principles that advocate for the inclusion of women in water governance as also mentioned under the Dublin Statement.

Methodology
The research is qualitative, and designed to tap into the more subtle forms of gender relations in the water sector. A systematic literature review that included peer-reviewed articles, policy documents and reports between 2000 and 2025 on gender roles in water governance and management in Italy and European Mediterranean countries (e.g., Spain, Greece, Turkey) will be conducted. The primary source of data, will be collected from 25 semi-structured interviews with Italian and water professionals from five other Mediterranean countries who were purposefully selected according to job titles (e.g., policy makers, engineers, community water managers) in the purpose of an opportunity for diversity. The interviews inquired about women's experiences, views of gender role expectations, and obstacles to participation on an even playing field. Three case studies were also prepared, one on the role of women in Italy's rural water user associations, one on transboundary water projects in the Mediterranean and urban water utilities in Spain. Data collection will prioritise narrative depth to uncover cultural and institutional factors shaping gender dynamics.

Original Material or Theory
The research will present a new "Gendered Water Governance Matrix," developed as part of interdisciplinary research that combines feminist political ecology and critical masculinity studies, to explore how gendered norms and masculinities condition institutions in the water sector. The matrix diagrammatises the connections between gender, power, and resource control, paying attention to intersections of ethnicity, urban/rural divisions, and class relations. It provides a fresh perspective to analyse how

masculinised norms marginalise women and impede gender-equitable water governance, particularly in the cultural diversity of the Mediterranean countries.

Type of Analysis

Qualitative data will be analysed using thematic content analysis. The content analysis will be applied to the interview transcripts and case study narratives and will be coded using an iterative process to identify recurring themes, such as gendered labour divisions, barriers to women's leadership, and the influence of masculinity on decision-making. Cross-country comparisons highlighted variations in cultural norms and institutional practices.

Conclusions

Since the research on gender dynamics in the water sector in Italy and in the European-Mediterranean reaches is still to be conducted, some final conclusions cannot be made. It needs to undertake to carry on some finalisation. It is anticipated that women might have limited weight and hollowness of representation, where women have important roles in household and community water management, but with only a marginal presence in the workforce of water utilities. Some policies such as gender-focused mentorship programs and institutional reform would be recommended to support equal and sustainable water management, once endorsed by new study results.

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Women Leading the Flow: Female Representation in UNESCO Water Chairs

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Presenting author

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ABSTRACT

in progress

Transboundary high-level negotiations: an exclusive all-male club?

Presenting author

Ana Elisa Cascão
(Independent researcher, Portugal)

ABSTRACT

Despite the constant allusions to transboundary water conflicts, countries do engage in negotiations – even when the objective is not to promote cooperation but rather to assert strategic dominance and 'power over rights'. Negotiation teams involve officials from water ministries, technical and legal experts, diplomats, and even security actors. Nine out of ten are usually male. This can be understood as a lingering 'tradition,' because these fields have long been dominated and self-preserved by men. And despite the growing number of extremely qualified women in those fields who reach middle-rank positions, they are still mostly absent from high-level negotiations. Ultimately, it might not be a result of patriarchy, mansplaining, or a lack of female empowerment, but rather a 'club mentality' in which only a few privileged individuals can take part – based on family pedigree, economic connections, political affiliations, as well as social class. Perhaps, if a woman ticks these boxes, she is more likely to sit at the high-level negotiation table.

Empowering Women in Water Diplomacy in the Middle East and North Africa. Highlights from the Comparative Study of Egypt, Jordan, Lebanon, Morocco, and Palestine

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Presenting author

Natasha Carmi
(University of Geneve and Geneva Water Hub, Switzerland)

ABSTRACT

Theoretical framework (Background/How the work came about)

Strengthening the skills of 21st century female water diplomats is crucial for having more women in leadership and decision-making positions in water diplomacy and transboundary water cooperation settings. The presence of women in such settings is not solely about securing quotas and sharing seats, nor is it an end in itself. Rather it is part of a comprehensive approach towards water security and regional stability that effectively addresses diversity, inclusion, social equality, and women's role.

This was the view of the almost 100 women water experts from Egypt, Jordan, Lebanon, Morocco, and Palestine, who contributed to the elaboration of a *Comparative Study on Empowering Women in Water Diplomacy in the MENA region*.

The Study, which was the initial outcome of the collaboration between the Global Water Partnership – Mediterranean (GWP-Med) and the Geneva Water Hub (GWH), was led by six female regional experts and compared the challenges and identified the similarities and differences in the female water expert leadership faced across the five countries, as well as the capacity building needs for gaining skills of modern diplomats

Methodology, Original Material/Theory, Type of Analysis

The Comparative Study capitalised on the methodology of a basic technical/mapping exercise undertaken in 2017 in three Levant countries (Lebanon, Jordan, Palestine) [1] and adopted the same methodology of surveying and interviewing women in water-related institutions. The Study reviewed and updated the 2017 work in the three countries and expanded the mapping to the Maghreb sub-region by including the cases of Egypt and Morocco.

More specifically, a short questionnaire[2] was developed to map the main challenges. The closed questions were analysed using the "**S**tatistical **P**ackage for the **S**ocial **S**ciences" (SPSS) software; while the open-ended responses were qualitatively analysed to provide more in- depth and narrative explanations of responses.

In all countries, attention was paid to selecting female representatives of all water sector actors including government authorities at different levels, utilities, private sector, academia, NGOs, elected women, and in the case of Morocco also female farmers.

Conclusions

In the MENA region and globally, the role of women in major political decision-making, remains an untapped potential. The Study has identified a set of skills that provide women with more opportunities, including networking and learning from each other.

Tailored capacity building was a key request of the members of the informal network of female experts that has grown out of the Comparative Study. The Initiative conducted in 2021 the 90-Minute series: a set of interactive Q&A sessions with prominent diplomats and transboundary water cooperation experts, covering themes carefully drawn from the findings of the Comparative Study and built around an experiential learning process, as one of the most effective ways to promote professional integration and develop leadership skills

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[1] The first mapping exercise has been published as an article in the Journal of Hydrology 569 (2019) 330-346 entitled *Empowering women in water diplomacy: A basic mapping of the challenges in Palestine, Lebanon, and Jordan*.

[2] The total number of questions was 19; 12 were closed questions, 2 open questions, and the rest combined.

11. PANEL 6 – AQUIFER RECHARGE, GREEN WATER & SOIL-WATER MANAGEMENT, RAIN MANAGEMENT

MODERATORS
Francesca Greco (Marie Sklowodska Curie Researcher, University of Bergamo, Italy)
Lorenzo Costa (EE. USA, Scoscesa)

Aquifer Recharge project “BlueRecharge”

Presenting author

Alessandro Bosso
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Co-author

Francesco Cavazza
(Regione Emilia Romagna, ART-ER, Italy)

ABSTRACT

The speech is focused on the innovative character of the Blue Recharge interreg project. The project aims at promoting managed aquifer recharge (MAR) mechanisms, including through the implementation of an innovative incentive system called blue credits. MAR consists of a process of transferring water from the surface to the subsoil in order to implement projects for storing the resource in underground water bodies.

The project began in February 2024 and will end in July 2026. The Italian partners are ART-ER, Consorzio Canale Emiliano Romagnolo, Venetian cluster, and Exo srl, while the Croatian partners are the Municipality of Vodnjan (Lead Partner), the University of Rijeka, the Faculty of Economics and Business of the University of Rijeka, and Istrian Water Protection System. The Emilia-Romagna Region and the Istria Region are participating as associate partners.

The overall objective of the Blue Recharge project is to promote the achievement and maintenance of good groundwater quality and quantity, ensuring the availability of groundwater resources without exceeding the long-term average annual extraction rate.

The project involves testing MAR practices in two pilot areas located in Emilia-Romagna and Istria. In Emilia-Romagna demonstration activities are conducted in a wetland in an agricultural area located in the eastern part of the region and involve modeling the recharge mechanism, assessing the amount of infiltrated water, and implementing the blue credit mechanism.

Blue credits, similar to carbon credits, are a tool designed to enhance an additional environmental benefit, which for carbon credits corresponds to a reduction in CO2eq emissions or an increase in carbon storage, while in the case of blue credits, it takes the form of an increase in groundwater resources resulting from the implementation of a groundwater recharge project, without which the increase would not take place.

The Political Geography Importance of Greenwater in Virtual Water Trade

Presenting author

Naho Mirumachi
(Professor, King's College London, UK)

Co-author

Francesca Greco
(Marie Sklowodska Curie Researcher, University of Bergamo, Italy)

ABSTRACT

in progress

Fossil Water & Renewables Capitalism in Siwa Oasis (groundwater depletion, solar pumping)

Presenting author

Youssef Ramez Boktor
(Post doctoral fellow, City University of New York, USA & CEDEJ, Cairo Egypt)

Co-author

Amr Khairy Ahmed
(Post doctoral fellow at IFAO and the Transnational institute, Cairo, Egypt)

ABSTRACT

"Water from this shallow old well was pure. We used it to make good tea. Five years ago, with the rising levels of the run-off irrigation water spots at the center of the oasis, it became salty enough to use it for pickling olives" – Interview with a Siwan farmer, March 2024.

This paper explores how the accelerated expansion of groundwater extraction in Siwa Oasis has come to threaten diverse socio-ecological arrangements that have long been able to sustain life in the oasis.

Siwa is one of the oldest oases in the world, and a key gateway to the North African Sahara. Over the past ten centuries—at the very least—Siwa has been home to Egypt's only Amazigh community, and the easternmost extension of Amazigh presence in North Africa. Life in Siwa, and all its social, economic, and cultural relations, have long been shaped around water that used to flow naturally from the oasis's two hundred traditional wells—wells that were managed communally by the local society.

By placing water at the center of its analytical lens, the paper shows how the rapid spread of solar-powered water pumping technologies contributed to the degradation of the oasis's ecological balance, by enabling the expansion of land reclamation around the oasis and the extraction of massive amounts of water—threatening not only the socio-ecological system, but also the economic and cultural fabric of Siwan life.

Solar power is usually imagined as a solution to global warming. But in this case, it has become a tool that enabled open and nearly cost-free extraction of groundwater—threatening an entire ecological and social system. In this article, we ask how Siwa ended up in a situation where renewable energy accelerates socio-ecological collapse—contradicting its commonly assumed sustainable role in a post–fossil fuel future. By making a certain scale of large-scale agricultural investment economically viable—the greedy deployment of 'green energy' has led to a condition of displacement in place, where economic, social, and ecological transformations are pulling the relatively stable order of life in Siwa—its economy, society, and environment—from under the feet of its inhabitants, turning small farmers into landless, hired laborers.

Nature-based solution for the management of green water and aquifer recharge

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Presenting author

Lorenzo Costa
(Lecturer at the Elemental Ecosystems, USA & CEO at La Scoscesa)

ABSTRACT

Can agriculture reverse landscape dehydration and help redesign our water cycle?

Agriculture can become a driver to reverse soil dehydration, reduce the effects of climate change, and also sustain food production. More extreme weather is creating an idea that we can only speak about water on an emergency basis. The truth is the opposite: we can work with water and make it help us reverse many difficult situations we are living in Italy and Europe. We pass from drought to floods and often farmers just live through these events with loss and uncertainty. The usual response to extreme weather events is if governments will pay emergency relief cheques. Agriculture uses what we call green water, usually pumping it from underground. This is only taking the production to live in more difficult conditions because the water table in many regions is collapsing. How can agriculture guarantee its water necessities if nothing is done to design recharge systems? and how can agriculture become a leader in water management reducing the consequences of extreme rain events?

First of all our relationship with water has to be cultural. Italy is an incredible example of different water cultures, which evolved in relation to orography, climate, and land use.

Can we regain knowledge and use those water cultures?

Traditional water management can teach us a lot, and can become an incredible foundation for our future agriculture. We have to keep in mind that water is not only a resource for us, but mostly an element of our landscapes, the ecosystems we live in. Traditional knowledge on water evolved from the observation of water's interaction with soil, and rocks. Then came technology that solved many different limitations but broke that connection.

By sharing examples from a seven year case study in a farm in central Italy, and other water management solutions adopted in the last four years in different regions in agricultural areas, we will show how soil fertility and plants react to water management. How we can reduce erosion and nutrient loss creating a cycle of regeneration instead of degeneration. Ecological water management can reduce the extreme weather events and help balance the water cycle. Designing water solutions can infiltrate incredible amounts of runoff in the ground, reducing the effect of floods and even recharging aquifers.

What is the role of agriculture in the new water paradigm? Can agriculture sit at the table where policies are made and not only be treated as an emergency relief beneficiary?

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Integrating KNN-Based Climate Forecasting into Green and Blue Water Planning: A Data-Driven Tool for Agricultural Resilience in the Mediterranean

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Presenting author

Lisa Napolitano
(Junior Researcher, CMCC Foundation, SOWAS Division (Soil and Water Systems Division, Italy)

ABSTRACT

Theoretical Framework
This work explores the intersection between hydroclimatic variability, soil-water management, and agricultural resilience across the Mediterranean region, particularly in arid and semi-arid areas. It is grounded in the principles of Integrated Water Resources Management (IWRM) and water governance, with a particular focus on the strategic role of green water in building agricultural resilience. A climate-responsive Decision Support Tool (DST) is presented to support planning under changing climate scenarios. Designed for application at both basin scale and farm level, the DST integrates blue and green water to inform land-use and irrigation decisions across the water cycle. Piloted in Jordan and soon extended to four other Mediterranean sites, the focus here is on the Jordan pilot and emerging findings from the broader implementation.

Methodology
The DST combines climate services, hydrological and agricultural modeling, and stakeholder-defined management rules. A core component is the climate module, which estimates inflows to the King Talal Reservoir (KTR), the primary irrigation source in the Jordan Valley. Inflow projections are generated using a K-Nearest Neighbors (KNN) data-driven machine learning algorithm, informed by bias-corrected climate data from ERA5 and CMIP6 under historical, SSP1-2.6, and SSP3-7.0 scenarios. The algorithm uses hydroclimatic predictors such as cumulative precipitation and water balance (precipitation minus evaporation), capturing both blue and green water dynamics. The model is calibrated and validated against historical river flow records, including natural runoff and treated wastewater inputs from the As-Samra Wastewater Treatment Plant.

Original Material
A key innovation of this work lies in coupling KNN-based inflow forecasting with adaptive water management decisions. Forecasts generated by the KNN model are dynamically integrated into modules simulating irrigation demand, soil moisture, and crop water stress. This supports timely and targeted irrigation responses. Threshold-based irrigation rules—co-designed with local stakeholders—link seasonal water availability to operational decision-making, creating a feedback loop that enhances both water-use efficiency and agricultural resilience. Crucially, the explicit inclusion of green water in the planning framework enables more adaptive responses to droughts, floods, and erosion across Mediterranean agro-ecosystems.

Type of analysis

The DST enables scenario-based analysis along both climatic and management dimensions, comparing Business-as-Usual (BAU) with adaptive strategies. These include precision irrigation, infrastructure upgrades, and land-use changes aimed at improving soil-water retention and reducing exposure to extreme events. A System Dynamics Model (SDM) captures interactions between water availability, soil health, and agricultural productivity, enabling cross-sectoral trade-off assessments. The tool operationalizes an “avoided losses” approach to quantify how adaptation strategies mitigate environmental, economic, and food security risks.

Conclusions

Findings from the Jordan pilot demonstrate that integrating data-driven inflow forecasting with adaptive, multi-scale water management improves water allocation and strengthens agricultural resilience. The DST offers a participatory platform for evidence-based decision-making, prioritizing soil moisture, green water use, and long-term sustainability. Its digital interface improves accessibility for farmers and water managers. Broader insights from other Mediterranean sites will provide comparative input to support EU-level strategies on drought, flood,

12. PANEL 7 – COMPARATIVE HYDROPOLITICS: POLICY CONVERGENCES ON WATER FOOD ENERGY NEXUS, PRIMA PROJECTS APPRAISAL, DESALINATION, DAMS & ELECTRICITY

MODERATORS

Fernando Nardi (Full professor of Engineer, Sapienza University of Rome, Italy)

Marco Tononi (Assistant professor, University of Bergamo, Italy)

INTRODUCTION

Local knowledge, practices, and beliefs related to ecology and gastronomy, including ecological history, human ecology, and associated ingredients, food products, and dishes, form the backbone of many local small-scale food systems worldwide, particularly in peripheral and marginal rural areas.

Despite their significance, most of these systems remain largely undocumented and overlooked by scientists and institutions, despite their potential role in informing place-based solutions to address future challenges of food systems worldwide. Discovering and revitalizing them and their heritage may be essential to providing sustainable scenarios for rural development, eco-tourism, and the small-scale food and restaurant sector.

In this context, interdisciplinarity emerges as a key approach to exploring local and traditional bodies of food knowledge and envisioning possible strategies aimed at their dynamic conservation, coevolution, and promotion.

Rhône River & Nuclear Energy Governance (rights of rivers, transboundary governance)

Presenting author

Cyrille Vallet
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Co-author

Aline Telle
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ABSTRACT

Water management in Europe is confronted with numerous challenges which may result in heightened tensions between users. Our contribution focuses on one of the subcomponents of the water-energy-environment nexus. First, the impacts of climate change are being experienced more acutely in the territory and it is anticipated that the situation will deteriorate further. The hydrological regimes of the European rivers are undergoing dramatic changes. For instance, the Rhône River is projected to experience a 30% decrease in summer flows and a 30% increase in winter flows by 2050 (BRLi, 2022). Second, the energy policy, as established by various EU and national acts, incorporates electrical nuclear production as a transition mode of production towards green electricity and decarbonation. This results in an increase in the number of nuclear power plants in the coming decades while capacity is projected to rise from 98 GWe in 2025 to approximately 109 GWe by 2050 (EU Commission 2025). In the context of the Rhône River, the French government has formally declared its intention to construct two new nuclear power plants at the Bugey site. This site is situated less than 100km downstream Geneva Town, a municipality that has consistently expressed strong opposition to the nuclear produced electricity, including through dedicated laws. Geneva has initiated legal actions in response to the French decision. Third, various NGOs and citizens movements are advocating for the rights of rivers as a novel approach to river management. Vallet (2025) has demonstrated that this movement requests a better association of the riparian population within the decision-making process. Finally, the main European rivers are transboundary. Their management is characterised by a high degree of complexity due to both political and administrative fragmentation.

In this context, our research question is “how do various water actors frame legal and democratic tools to influence the river management to face the water-energy-environment nexus?.” We are proposing to develop the example of the Rhône River. Following a decade of ongoing discussions between France and Switzerland, it is anticipated that a transboundary agreement will be signed in September 2025. Furthermore, an examination will be conducted into the arguments and positions adopted by the various actors during the public debate that was organized by the French National Public Debate Commission (spring 2025). Finally, the evolutions of the decision-making process in relation to the rights of rivers will be analysed.

Co-Defining a WEFE-Nexus Transition Vision and Action Plan in the Duero Nexus Ecosystem Lab

Presenting author

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Fernando Nardi (Associate professor, University of Rome Tor Vergata, Italy)

ABSTRACT

The Spanish Duero River basin extends 68 000 km2, most of them are agricultural areas. During this century, the management of water resources in Spain deals with more frequent drought periods which turn the spotlight on irrigated agriculture (70 % of the total water demand). In addition, energy, and fertilizer (the main resources for food production) prices have increased and have reduced farmer's revenue. Likewise, the aging and the decrease of rural population add further issues to the Duero basin's agricultural sector. Within this context, innovative strategies taking into account young farmers and promoting resilience to climate change, are needed.

The Prima Project NEXUS-NESS has developed a Duero Nexus Ecosystem Lab (NEL) in the Cega-Eresma-Adaja and Bajo Duero sub basins. Four workshops were developed were key stakeholders from various WEFE entities promote and co-define WEFE-Nexus transition actions, looking forward to improving local WEFE-Nexus conditions.

The first workshop presented the WEFE NEXUS methodology through the Responsible Research Innovation (RRI), by the application of the RRI Roadmap ©TM; to identify the main WEFE NEXUS challenges and engage stakeholders. The second one presented the concrete vision of WEFE NEXUS; the basic concepts of WEFE were introduced to the NEL members and they were also trained to look for a WEFE NEXUS management vision. Based on this information and the challenges identified in the first workshop, the serious game methodology was used to analyze, in a positive, negative, and alternative way, measures and actions to address the challenges and identified the advantages and limitations of these actions. The third workshop presented the "as it is" scenario; it showed real relevant data to evaluate present conditions within the NEL through different indicators and to co-define a vision of the future "as it should be" scenario. The fourth workshop had the goal to review, refine, and validate the draft WEFE-Nexus Transition Plan. Prior to the workshop, stakeholders were provided with a draft to allow sufficient time for reflection. This approach fostered a more mature dialogue and collective sense of ownership over the transition actions. During this workshop, the NEL members were trained on the digital platform NEXUSHARE, which contains the items (papers, reports, blogs..) developed, to ensure their use and refinement.

The Duero NEL has produced a stakeholder-validated WEFE-Nexus Transition Vision and Plan. It centres around four key intervention measurements: improve fertilizer use efficiency, increase energy efficiency, optimize water use efficiency, and reduce dependence on conventional energy sources; and seven concrete and complementary actions. These should be implemented at field scale and evaluated with 12 selected and quantified WEFE NEXUS indicators. The workshop laid a robust foundation for the implementation of the WEFE NEXUS Transition Plan in the Duero basin, advancing stakeholder alignment, prioritising actionable measures, and charting a realistic path forward for long-term sustainability.

The Plan offers a replicable model about how rural landscapes can balance agricultural productivity, water conservation, energy efficiency, and ecosystem resilience, contributing to a broader European transition toward sustainable resource management.

Resilience Without Overreach: NCWR Strategies for Italy in a Climate-Driven Drought Context

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Presenting author

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Co-author

Guido Rianna
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ABSTRACT

Italy's increasing hazard of meteorological, agricultural, and hydrological droughts, potentially exacerbated by climate change, exposes critical resilience gaps within regional water portfolios. Within the EU Water Resilience Strategy (WRS), conjunctive water use, now expanded to incorporate non-conventional water resources (NCWR) such as desalination and wastewater reuse, emerges as a strategic operational source. This study draws on resilience theory emphasizing the dichotomy between proactive NCWR augmentation, prone to the Jevons Paradox and demand-induced erosion of resilience, and reactive deployment during drought events, which risks paradoxical dependency if emergency measures become normalized. Governance, technological, and socio-economic bottlenecks frame the operationalization challenges of NCWR in Italy's water security landscape.

The research utilizes outcomes from the PRIMA ACQUAOUNT project to highlight the crossroad between successful scaling instances of NCWR and innovations that remain pilot bound. This phase includes a detailed examination of governance frameworks, technological feasibility, and socio-economic constraints hindering broader NCWR adoption, while also demonstrating the pivotal role of PRIMA funding in the attempt to reduce science-policy divides. Second, the study undertakes a comparative case analysis of Qatar's desalination and wastewater/produced water systems, evaluating their operational frameworks, resilience strategies, and scalability challenges within a high-scarcity, energy-intensive context. This mixed-methods approach integrates policy analysis, institutional review, and scenario assessment to extract lessons transferable to Italy's distinct governance environment.

The study contributes original insights by situating Italy's current desalination capacity (~4% of supply) and suboptimal wastewater treatment compliance (56% versus the EU average of 76%) within a broader Mediterranean-Gulf context where endemic water scarcity has streamlined NCWR operationalization. It critically assesses recent Italian regulatory changes, including the 2023 "Drought Decree" facilitating small-scale desalination plants, as a policy window enabling enhanced water security in climate-sensitive basins such as Sicily and Apulia. By juxtaposing Italy's emerging NCWR framework with Qatar's established systems, the study theorizes NCWR integration as a resilience strategy contingent upon institutional safeguards to prevent baseline supply

expansion, coupled with robust demand management and scenario-based drought planning.

The analysis is a comparative resilience and governance assessment combining qualitative policy review with empirical data from the PRIMA ACQUAOUNT project and a case study evaluation of Qatar. Barriers to scaling NCWR technological, socio-economic, and institutional are systematically identified and contrasted. Qatar's operational bottlenecks, including energy intensity, brine management, and governance complexities, are critically appraised to inform adaptive transferability to Italy's context. This approach is grounded in scenario-based planning to anticipate climate-driven stress and operationalize resilient water portfolios. The findings underscore that while NCWR offers significant untapped potential for Italy's drought resilience, its integration must be carefully managed. NCWR should be positioned as a reactive, resilience-oriented resource, supported by strong institutional safeguards, demand management, and streamlined regulations. By synthesizing Mediterranean pilot experiences with Gulf-region operational frameworks, this study outlines a strategic pathway for Italy to transition NCWR from ad hoc or limited alternatives to core elements of integrated water resilience strategies, fully aligned with the latest EU water directives and frameworks.

Hydropolitics and the European Green Deal: the case of Italy and Hungary

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Presenting author

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ABSTRACT

The European Green Deal was meant to set the pathway for the comprehensive transition of the European Union towards sustainability. Although its main focus is climate change, the Green Deal pays only marginal attention to climate adaptation and its most important manifestation: changes in hydrology. As a result, most new water legislation adopted since 2020 represent a mere upscaling of existing measures on drinking water, urban wastewater, or priority hazardous substances. The also EU adopted two novel legal acts that go beyond the usual pollution control agenda – addressing agricultural water reuse and the restoration of the aquatic environment –, but neither of these tackle the root causes of Europe's unfolding water crisis, let alone its geopolitical implications. This lacuna was recognised and partly addressed by the recently adopted Water Resilience Strategy that is aimed at extending and scaling up the EU's activities as it concerns water. Yet, a first analysis suggests that the document represents a very modest level of policy ambition and that what is proposed therein by the European Commission will not suffice to reverse the negative trends in Europe's water resources, especially when it comes to quantity management. Not only does the Strategy fall short of the required level of intervention at domestic level, it remains completely oblivious of the growing transboundary water challenges of the EU. Overall, water policy changes adopted under the Green Deal are likely to have only marginal impacts on the hydropolitical map of Europe.

This is well illustrated by the case study of Italy and Hungary.

Italy shares a negligible part of the basins of the Danube, Rhine, and Rhone rivers. The most important river basin shared with neighbouring countries is the Po river basin. This basin includes two big Alpine lakes, the transboundary Lakes Lugano and Maggiore shared by Italy and Switzerland. While the Po river basin is managed by a District Basin Authority in accordance with the EU Water Framework Directive, the protection of the quality of the waters of the Lugano and Maggiore lakes are covered by an international agreement concluded by Italy and Switzerland in 1972. This part of the presentation will focus on the challenges related to transboundary water management in Italy.

Hungary represents the opposite end of the political spectrum. The country is fully situated within the Carpathian basin in the middle of the Danube catchment area. It receives 95% of its surface waters from 6 (!) upstream neighbours (Austria, Slovakia, Ukraine, Romania, Slovenia, and Croatia), while discharging all its flow-through waters towards downstream Serbia. This extreme volumetric exposure to exogenous waters is coupled with a history of severe transboundary pollution and floods. Under these

circumstances, Hungary has been forced to cooperate extensively with all its neighbours, albeit with variable degree of success. The presentation will outline the major hydropolitical issues and scenarios Hungary is facing in the central Danube valley at the external borders of the EU.