



Antje Bruns

## Socio-Hydrology:

The combined analysis of social and ecological challenges in the water sphere – A Syllabus

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# Social Hydrology

## Syllabus

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## 1 Socio-Hydrology and hydro-social research – placing people and power at the center of the water cycle

The class Socio-Hydrology engages with novel ways of analysing and conceptualizing water. In the Anthropocene, the combined analysis of social and ecological factors in the water sphere is key to address threats to water security and understand the (re-)production of inequalities related to water. This course provides an opportunity for Master Students in Geography and Environmental Studies to explore how they can better contribute to meeting the challenge to seeing water as a hybrid.

In water studies, historical, social and political factors have been neglected for a long time, and the hydro-cycle was conceptualised from a natural science perspective. Jamie Linton (REF) calls this perspective “modern water”. Although especially human geography has a long tradition of understanding aquatic ecosystems in relation to socio-political factors, interdisciplinary water studies have been the exemptions. The “modern water” paradigm that influenced both water science and water practice is now under change. The emerging new terminologies around water (such as socio-hydrology and hydro-social research) stand for a shift in perspective that aim to foster the social dimension in water studies. These perspectives help to unravel how different actors shape the way water bodies are used, aquatic ecosystems are altered and managed. It also unravels who benefits from water supply infrastructures and who doesn't benefit but bears the burden of water pollution, over-abstraction

### *Course Design and Course Overview*

The course is grounded in different disciplines and schools of thought, whereas human geography, political geography, political science and ethics are the most influential ones. It builds on those foundations by exploring how the flow of water shapes places and inequalities, it highlights the politics and ethics of defining goals, thresholds and metrics for sustainable water use. Contemporary scientific understandings of the complex and adaptive hydro-social systems and recent work by scholars are critically discussed.

In a series of lectures (12-14 weeks) the development of hydrology as a field of study, in which the hydrologic cycle forms the core concept and the anthropogenic transformation of water bodies is introduced. We examine current challenges and threats to water security that operate on different levels: urbanisation, economic growth, water pollution and degradation as well as agriculture as the main water consumers are being presented and discussed. Governance related aspects and socio-political factors as well as different water cultures are discussed and key concepts such as integrated water resources management presented. Participants will have the opportunity to apply the core concepts of the course to critique and extend some of the

most cited water studies addressing hydro-social relations. Some class sessions have been reserved to cover additional topics determined by the participants.

The aim of an accompanying seminar is to provide an in-depth focus on selected water problems in order to enhance a deep understanding on how the same issues play a role in different places (e.g. the social production of water scarcity) and how they are addressed in similar ways (e.g. IWRM) or situated water practices.

In the following we summarize key readings for selected topics that we find relevant for hydro-social studies<sup>1</sup>.

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<sup>1</sup> In the following we use the term socio-hydrology and hydro-social interchangeably. We like to motivate the interested reader, however, to study a recent review on different traditions and schools of thought *Wesselink, A., Kooy, M., & Warner, J. (2017). Socio-hydrology and hydrosocial analysis: toward dialogues across disciplines. Wiley Interdisciplinary Reviews: Water, 4(2).*

### 1.1 Introduction: the study of water and recent challenges

*„Water is not about water. Water is about building peoples’ institutions and power to take control over decisions.“*

*Sunita Narain, head of Centre for Science and Environment in India, on occasion of accepting the 2005 Stockholm Water Prize*

In the first overview lecture, we take a look at conceptualizations of water – from the hydrological cycle to socio-political perspectives on water. During the 20<sup>th</sup> century, water management developed from traditional uses and local industrial schemes to the “hydraulic paradigm” and finally, to the concept of modern water governance at the turn of the millennium. We will raise the question of whether there has truly been a paradigm shift from the natural, science based hydraulic paradigm to water governance and how dualisms of culture/society and nature are still being reproduced. With this in mind, we will also take an introductory look at the much talked about global water crisis.

#### *Topics*

- Natural hydrological cycle versus a socio-political perspective on water
- Development of water paradigms: Dualism of society and nature in science and water management practises
- Looking more closely at different understandings and explanatory factors of the global water crisis

#### *Literature*

Bakker K. Water: political, biopolitical, material. *SocStud Sci* 2012, 42:616–623.

Wesselink, A., Kooy, M., & Warner, J. (2017). Socio-hydrology and hydrosocial analysis: toward dialogues across disciplines. *Wiley Interdisciplinary Reviews: Water*, 4(2).

## 1.2 The history of modern water

*“The ways societies organise themselves in response to the need to control and manage water, and the geometries of power that are embedded in this dialectic, are extremely varied”*

*(Linton and Budds, 2014)*

Since the beginning of human time on earth, the question of how to access and manage water has shaped societies. From antiquity, the middle ages through to enlightenments and “modern water”, we take a look at the development of the meaning of water for humans. The modern understanding of water as a resource to be controlled and managed led to exponential construction of large technical projects that have had significant impacts on our societies and environment. The central human dimension in the flow of water led to the recognition of the importance of social practices in water. Social hydrology therefore puts “people and power” at the center of the water cycle.

### Topics

- From historical understandings of water to “modern” water
- The state hydraulic paradigm
  - Large scale water infrastructure projects worldwide
  - Changes in sediment load of rivers
- Paradigmatic changes in water studies and the hydro-social cycle

### Literature

Gleick P.H. (2000). The changing water paradigm: a look at twenty-first century water resources development. *Water Int.* 2000, 25:127–138.

Linton, J. (2010). *What is Water? The History of a Modern Abstraction*. University of British Columbia Press, Vancouver.

Linton, J. (2014) "Modern water and its discontents: a history of hydrosocial renewal." *Wiley Interdisciplinary Reviews: Water* 1.1: 111-120.

Linton, J. and Budds, J., 2014. The Hydro-Social Cycle: Defining and mobilizing a relational-dialectic approach to water. *Geoforum* 57. 170-180.

McCully, P. (1996). *Rivers no more: the environmental effects of dams* (pp. 29-64). Zed Books.)

Rosenberg, D. M., McCully, P., & Pringle, C. M. (2000). Global-scale environmental effects of hydrological alterations: introduction. *BioScience*, 50(9), 746-751.

Syvitski, J. P., Vörösmarty, C. J., Kettner, A. J., & Green, P. (2005). Impact of humans on the flux of terrestrial sediment to the global coastal ocean. *Science*, 308(5720), 376-380



Vörösmarty, C. J., & Sahagian, D. (2000). Anthropogenic disturbance of the terrestrial water cycle. *BioScience*, 50(9), 753-765.

### 1.3 The condition of aquatic ecosystems

*“Together with energy and nutrients, water is arguably the centerpiece for the delivery of ecosystem services to humankind.”*

*(Falkenmark and Folke, 2003)*

In this session, we take the Millennium Ecosystem Assessment as a basis to take a closer look to understand “how changes in ecosystems and ecosystem services have affected human well-being, how ecosystem changes may affect people in future decades, and what types of responses can be adopted at local, national, regional, or global scales to improve ecosystem management and there by contribute to human well-being” (MEA Synthesis Report). Students are asked to think about ecosystem services related to water and we also question the MEA as a lens to focus on water.

#### Topics

- What are (freshwater) aquatic ecosystems?
- Millennium Ecosystem Assessments
- What are ecosystem services?
- Risks facing ecosystem services
- Case Study - Water Framework Directive

#### Literature

Millennium Ecosystem Assessment (2005). Current State & Trends Assessment, Chapter 7. Freshwater Ecosystem Services, Chapter 20: Inland Water Systems; <http://www.unep.org/maweb/en/Condition.aspx>

Millennium Ecosystem Assessment (2005). Finlayson, C. M.; D'Cruz, Rebecca; Davidson, Nick (2005): Ecosystems and human well-being. Wetlands and water : synthesis. Washington, D.C.: World Resources Institute. <http://www.unep.org/maweb/en/Index.aspx>

Falkenmark, M.; Folke, C. (2003). Theme issue: Freshwater and welfare fragility: Syndromes, vulnerabilities and challenges, *Royal Society's Philosophical Transactions B Biology*, 358, p. 1440.

Vörösmarty et al. (2010). Global threats to human water security and river biodiversity. *Nature*, 467(7315), 555-561.

The EU Water Framework Directive - integrated river basin management for Europe, EU Commission, <http://ec.europa.eu/environment/water/water-framework/>

Moss, B. (2008): The Water Framework Directive: total environment or political compromise? In: *The Science of the Total Environment* 400 (1-3), S. 32–41. DOI: 10.1016/j.scitotenv.2008.04.029.



#### 1.4 Water Scarcity and Water Security

*“The scarcity at the heart of the global water crisis is rooted in power, poverty and inequality, not in physical availability”*

*(UNDP, 2006)*

Water scarcity is a topic that often gets framed in dramatic rhetoric in the media, yet still remains unclear in its true meaning. Is water scarcity something that is just out there (for instance in a desert, in arid regions) or are we able to develop a more nuanced understanding? How is water scarcity produced and why do some areas suffer from water scarcity? This lecture focuses on the physical, social and political background of water availability, looking closely at the science behind various global water models. If there is water scarcity, implying water **in**security, can we then in turn also have water security? We take a look at what this would entail and analyze different approaches to defining the concept water security.

##### *Topics*

- What is water scarcity? How is it conceptualized and measured?
- Presentation of Water GAP Model and other global models that try to assess water stress or water scarcity
- What is water security?
- Can security be a new guiding paradigm for research and policy?

##### *Literature and further readings*

Cook, C.; Bakker, K. (2012): Water security: Debating an emerging paradigm (22). In: Global Environmental Change (1), S. 94–102

FAO Water, <http://www.fao.org/nr/water/issues/scarcity.html>

Falkenmark, M. (2013): Water security – The multiform water scarcity. In: Lankford, B., Zeitoun, M. (Eds.) Water security - principles, perspectives and practise. Earthscan Water Text, Routledge

Rijsberman, F.R. (2006), “Water Scarcity: Fact or Fiction?”, Agricultural Water Management, Vol. 80, pp. 5-22.

UN Water (2013). What is Water Security? Poster. Online access: <http://www.unwater.org/topics/water-security/en/>

UNDP (2006) Human Development Report 2005. Beyond Scarcity: Power, Poverty and the Global Water Crisis. United Nations Development Program. New York.

White, C. (2012). Understanding water scarcity: Definitions and measurements. Global Water Forum. Australian National University, Australia. Online access: <http://www.globalwaterforum.org/2012/05/07/understanding-water-scarcity-definitions-and-measurements/>

Zeitoun, M. (2011): The Global Web of National Water Security. In: Global Policy 2 (3), S. 286–296. DOI: [10.1111/j.1758-5899.2011.00097.x](https://doi.org/10.1111/j.1758-5899.2011.00097.x).

## 1.5 Water infrastructures

*„...the diversity of different institutional structures and arrangements for water provision illustrates the complexity of urban infrastructure and its evolving relationship with different modes of social and economic organization”*

*(Gandy, 2004)*

Infrastructures can be defined as “built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space” (Larkin 2013). Essential for ordering and managing the flow of water for humans, water infrastructures have been critical in and for the development of cities. This session takes a closer look at water infrastructures and urbanism, as well as the changing understanding meaning of infrastructure – can we or must we expand our understanding to also capture those socio-technical systems that supply people with water beyond the pipe?

### *Topics*

- What is infrastructure? Types of water infrastructure; Infrastructures as socio-technical systems
- Development of (water) infrastructures in cities
- From the modern infrastructural ideal to fragmented urbanism
- Transforming water infrastructures – changing parameters
- Case Study - dimensions of global change affecting water infrastructures in Berlin-Brandenburg

### *Literature*

Gandy, M. (2004). Rethinking urban metabolism: water, space and the modern city. *City*, 8(3), 363-379.

Graham, S. (2000). Constructing premium network spaces: reflections on infrastructure networks and contemporary urban development. *International journal of urban and regional research*, 24(1), 183-200.

Graham, S., & Marvin, S. (2001). *Splintering urbanism: networked infrastructures, technological mobilities and the urban condition*. Psychology Press.

Hüesker, F., Moss, T., & Naumann, M. (2011). Managing Water Infrastructures in the Berlin-Brandenburg Region between Climate Change, Economic Restructuring and Commercialisation. *DIE ERDE—Journal of the Geographical Society of Berlin*, 142(1-2), 187-208.

Kaika, M., & Swyngedouw, E. (2000). Fetishizing the modern city: the phantasmagoria of urban technological networks. *International Journal of Urban and Regional Research*, 24(1), 120-138.

Larkin, B. (2013). The politics and poetics of infrastructure. *Annual Review of Anthropology*, 42, 327-343.

Molle, F., Mollinga, P. P., & Wester, P. (2009). Hydraulic bureaucracies and the hydraulic mission: flows of water, flows of power. *Water Alternatives*, 2(3), 328-349.

### 1.6 Access to Water, Human Right to Water and Water Rights

*“[a]ll peoples[...] have the right to have access to drinking water in quantities and of a quality equal to their basic needs.”*

*(Mar del Plata conference in Argentina, 1977)*

The Millennium Development Goal (MDG) Target 7 (c) stated the aim to “halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation”. This lecture introduces some global facts and figures to safe water access and how far this MDG has been achieved and what the new Sustainable Development Goals (SDG) are aiming for. We also look at how to measure or even define water access and understanding access as more than just a physical term, looking at the political and processual meanings of access. We then look at the overarching question of water as a human right – the idea of which first emerged at international environmental conferences in response to water justice struggles around the world. Only in 2010 was the human right to water recognized by the General Assembly of the United Nations and later affirmed by the UN Human Rights Council.

#### *Topics*

- Access to improved drinking water
- Definitions of access to water
- Access to water as a human right
- Water rights - (human) right to water vs. water rights

#### *Literature*

Majzoub, T. (2010): Water Laws and Customary Water Arrangements. In: Mohamed El-Ashry, Najib Saab und Bashar Zeitoun (Hg.): *Water: Sustainable Management of a scarce resource*. Report of the Arab Forum for Environment and Development. Arab Forum for Environment and Development (AFED), S. 137–152.

Sultana, F. (2006): Gendered waters, poisoned wells: Political ecology of the arsenic crisis in Bangladesh. In: K. Lahiri-Dutt (Hg.): *Fluid bonds: Views on gender and water*. Kolkata: Stree Publishers, S. 362–386.

Zwarteveen, M. Z. (1997). Water: From basic need to commodity: A discussion on gender and water rights in the context of irrigation. *World development*, 25(8), 1335-1349.

Bauer, C. J. (1997). Bringing water markets down to earth: The political economy of water rights in Chile, 1976–1995. *World development*, 25(5), 639-656.

### 1.7 The commodification and privatization of Water

*"Water has an economic value in all its competing uses and should be recognized as an economic good"*

*(Dublin Principle n.4, 1992)*

In a shift away from viewing governments as responsible for provisioning public services as part of the neoliberal agenda, the private sector emerged as an answer to promote efficient allocation and management of scarce (water) resources. In this session, the spread of privatization is analyzed in more detail, looking at the different features, advantages and disadvantages of privatization. Resistance to water privatization has received wide media coverage, yet here we want to question the dichotomy of private vs. public and look at a more nuanced view of water provision.

#### *Topics*

- The emergence of private sector participation in water supply
- Resistance to water privatization
- Different forms of water privatization and commodification

#### *Literature*

Bakker, Karen. "Archipelagos and networks: urbanization and water privatization in the South." *The Geographical Journal* 169.4 (2003): 328-341.

Bakker, Karen. "Neoliberalizing nature? Market environmentalism in water supply in England and Wales." *Annals of the association of American Geographers* 95.3 (2005): 542-565.

Bayliss, K., Hall, D., & Lobina, E. (2001). *Water privatisation in Africa: lessons from three case studies*. Londres: School of Computing and Mathematical Sciences/Public Services International Research Unit (PSIRU).

Budds, Jessica, and Gordon McGranahan. "Are the debates on water privatization missing the point? Experiences from Africa, Asia and Latin America." *Environment and Urbanization* 15.2 (2003): 87-114.

Hall, D., Lobina, E., & Motte, R. D. L. (2005). Public resistance to privatization in water and energy. *Development in practice*, 15(3-4), 286-301.

Whitfield, Lindsay. "The politics of urban water reform in Ghana 1." *Review of African political economy* 33.109 (2006): 425-448.

### 1.8 How to do hydro-social research in the field – Case Study

In this session, external scholars could be invited to share their experiences with hydro-social research in the field. Case studies have the advantage of making abstract concepts more tangible, and research experience can be shared with students so that they can understand and be inspired by actual work on the ground.

In this course, **WaterPower** was used to illustrate how inter- and transdisciplinary research in the water sphere can be carried out: “WaterPower is a laboratory for experimenting with novel ways of doing research in urban water studies. We contribute to current debates on society-nature relations by mapping, analyzing and understanding processes that unfold in the urban water sphere.” [www.waterpower.science](http://www.waterpower.science)

It is, however, also insightful to present the conditions for and approaches of a co-production of knowledge.



### 1.9 Topics

- How does the research practice of inter- and transdisciplinary projects look like? Who is part of these projects and what are the challenges?
- What is post-normal science/mode-2 science? What characterizes this research approach?

### 1.10 Conflicts about water

*“rivalry comes from the Latin rivalis, or “one using the same river as another.”*

*(Wolf et al. 2005)*

Water is different from many other resources in that it flows – between people, watersheds, borders... Water is transboundary on several levels. As it is such an essential resource and requires governance at all its levels from groundwater, source to mouth or source to user, conflicts are to be expected. This lecture looks at the history of water conflicts, the basics of geographical conflict studies and links water conflicts to the inherently attached topics of land grabbing, and upstream-downstream competition over water.

#### *Topics*

- Water conflict potential – what makes water different from other resources?
- Fundamentals of geographical conflict studies
- Relationship between water and land grabbing
- Water and power: Who controls the flow of water?
- Upstream-Downstream and transboundary conflicts

#### *Literature*

Franco J, Feodoroff T, Kay S, Kishimoto S, Pracucci G (2014) The Global Water Grab - A Primer. Transnational Institute for Hands off the Land Alliance

Gleick, P. H. (2000). Water conflict chronology. *The World’s Water, 2008–2009: The Biennial Report on Freshwater Resources*, 151-196.

Mehta, L., Veldwisch, G.J. and Franco, J. (2012) Introduction to the Special Issue: Water grabbing? Focus on the (re)appropriation of finite water resources. *Water Alternatives*(5 (2)):193–207

Ohlsson, L., & Turton, A. R. (1999). The turning of a screw: Social resource scarcity as a bottle-neck in adaptation to water scarcity. Occasional Paper Series, School of Oriental and African Studies Water Study Group, University of London.

Rothfuß, R. (2010). Geographische Konfliktforschung und Geopolitik: Zukunftsaufgabe Friedenssicherung. *Jahresheft Geopolitik*, 4(1), 36-45.

Rulli, M. C., Savioli, A., & D’Odorico, P. (2013). Global land and water grabbing. *Proceedings of the National Academy of Sciences*, 110(3), 892-897.

Wolf, A. T. (1998). Conflict and cooperation along international waterways. *Water policy*, 1(2), 251-265.

Wolf, A. T., Kramer, A., Carius, A., & Dabelko, G. D. (2005). Managing water conflict and cooperation. *State of the World 2005: Redefining Global Security*, 80-95.



Zeitoun, M.; Mirumachi N. (2008) Transboundary water interaction I: re-considering conflict and cooperation. *Int Environ Agreements* 8(4):297–316. doi: [10.1007/s10784-008-9083-5](https://doi.org/10.1007/s10784-008-9083-5)

### 1.11 Water: more than a resource – spiritual and religious water practices

*“Rivers all over Europe were named for water goddesses: for example, the Seine (which has one of the few remaining Celtic temples at its source) was sacred to Sequana, and the Marne was named for the Gaulish ‘Divine Mother’ goddesses, the Matronae.”*

*(Strang, 2004)*

Water has always played an important spiritual role in our societies. Indeed, water is a central element in most religions, ancient and modern. It is imbued with meanings and values that go well beyond the instrumental and technical image we tend to have of the resource. From rivers named after water deities, religious practices such as baptism in Christianity to the role of water in Pope Francis’ encyclical, (western) religion is inherently connected to water. Going beyond this, we also take a look at the meaning of water in indigenous cultures and how the values that are embedded in the “Indigenous Peoples’ Water Declaration” are being heard (or not heard) in modern water governance.

#### Topics

- Sacred and religious water
- Subduing water and the (hidden) meanings in our modern water management
- Western vs. Indigenous water values
- Example of sacred water bodies and conflicts over their use

#### Literature

Strang, V. (2004). *The Meaning of Water*.

Groenfeldt, D. (2003). Water development and spiritual values in western and indigenous societies. In 3rd World Water Forum Session on Water and Cultural Diversity.

Mackinlay, J. 1993 [1893]. *Folklore of Scottish Lochs and Springs*, Glasgow: William Hodge and Co.

Water Culture Institute; <http://www.waterculture.org/Home.html>;  
<http://blog.waterculture.org/>

Indigenous Rising; <http://indigenusrising.org/about/>

Assembly of First Nations; <http://www.afn.ca/en/honoring-water>

Pope Francis’ Encyclical; [http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco\\_20150524\\_enciclica-laudato-si.html](http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html)

### 1.12 The role of water ethics

*“Try to think about a river and ethics together. These two words do not fit together easily because we tend to separate the world of the “natural” from that of the “ethical.”*

*(WEN 2015, Rodina, L.)*

Behind every decision we make lies a set of values – just as behind every water governance decision also lies a set of values that we do not usually tend to uncover or question. The purpose of this lecture is to do precisely that and ask ourselves how water is being valued, how it can be valued (domains of water ethics) and how it should be valued (normative level). The “water ethics charter” is an example of a proposal for anchoring ethics in water governance.

#### *Topics*

- What are water ethics?
- How do we value water?
- Domains of water ethics
- Water ethics charter
- Thought experiment – should the dam be built?

#### *Literature*

COMEST. World Commission on the Ethics of Science and Technology (COMEST) and the International Hydrology Programme (IHP). Best Ethical Practice in Water Use, Paris UNESCO, 2004.

Liu et al. (2011). Water Ethics and Water Resource Management. Bangkok, Regional Unit for Social and Human Sciences in Asia and the Pacific (RUSH-SAP), UNESCO Bangkok. v + 73 pp.

Brown, P. G. (2010). Water ethics: foundational readings for students and professionals. Island Press.

Groenfeldt, D., & Schmidt, J. J. (2013). Ethics and water governance. *Ecology and Society*, 18(1), 14

Groenfeldt, D. (2014), The Four Faces of Water Ethics; <http://blog.waterculture.org/>

Rodina, L. (2015). Towards a Water Ethics Manifesto. <http://waterethicsnetwork.blogspot.de/>

Water Culture Institute; <http://www.waterculture.org/Home.html>; <http://blog.waterculture.org/>

Water Ethics Network (WEN); <http://waterethics.org/>

Presentations:

Groenfeldt, D. (2012). Water Ethics in Practice. The Downstream Neighbour, Denver, Colorado.

Groenfeldt, D (2013). Water Ethics: A Values Approach to Solving the Water Crisis. Presentation at Research Institute for Humanity and Nature (RIHN) in Kyoto, Japan.

### 1.13 Controlling, managing and governing water

*“Water governance refers to the **political, social, economic and administrative systems** in place that influence water’s use and management. Essentially, who gets what water, when and how, and who has the right to water and related services, and their benefits.”*

*(Water Governance Facility)*

The concept of “water governance” has already been mentioned and used many times in this module. But what is really meant by this? Is it for example the same as water management? This lecture looks more closely at the definitions and meanings of water governance. Integrated Water Resources Management (IWRM) and Adaptive Water Resource Management (AWRM) serve as examples of approaches to water governance.

#### *Topics*

- What is water governance? Difference between government and governance.
- Management approaches that try to alter water governance: Integrated Water Resource Management (IWRM) and Adaptive Water Resource Management
- Core elements of governance: actors, scales and power

#### *Literature*

Biswas, A. K. (2004). Integrated water resources management: a reassessment: a water forum contribution. *Water international*, 29(2), 248-256.

Pahl-Wostl, C. and J. Sendzimir (2005): The relationship between IWRM and Adaptive Water Management. *NeWater Working Paper 3*. [online] URL: <http://www.newater.uos.de/intern/sendfile.php?id=50>

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Mollinga, P. P. (2008). Water, politics and development: Framing a political sociology of water resources management. *Water alternatives*, 1(1), 7-23.

Molle, F. (2008). Nirvana concepts, narratives and policy models: Insights from the water sector. *Water Alternatives*, 1(1), 131-156.

NeWater (2009). Pahl-Wostl et al. Adaptive Integrated Water Resources Management (AWM): Explicitly addressing today’s challenges. An Integrated Project in the 6th EU Framework Programme 2005 – 2009.

### 1.14 Transboundary Water Governance

*“All transboundary water bodies create hydrological, social and economic interdependencies between societies.”*

*(UN Water 2008)*

Water flows – and in its very natures, crosses boundaries that are both natural (watersheds) and man-made (borders). This creates challenges in water governance, as impacts in one area will transfer and “flow” to others, requiring integrated and coordinated management. This lecture takes a look at some of the basic principles behind transboundary water management, with case studies of both positive and negative examples.

#### *Topics*

- What is transboundary water governance and why is it relevant?
- History, challenges, goals, principles and pillars
- Mismanagement (Aral Sea) and positive management (Great Lakes)
- Two in-depth examples: the Cubango-Okavango River Basin and groundwater
- Multi-level governance and the European Water Framework Directive

#### *Literature*

Uitto, J. I., & Duda, A. M. (2002). Management of transboundary water resources: lessons from international cooperation for conflict prevention. *The Geographical Journal*, 168(4), 365-378.

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<http://www.un-igrac.org/>

### 1.15 Multi-Level Water Governance in Europe

The governance of freshwater ecosystems is illustrated by the example of the Water Framework Directive in Europe. Here, it is of interest how principles like participation and cooperation are implemented in the multi-governance system and to detect changes in decision-making processes – as well as changes in power dynamics among different water users.

#### Topics

- What is multi-level water governance and why is it relevant?
- History, challenges, and political goals of water management in the EU
- Principles and implementation of the European Water Framework Directive

#### Literature

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### **1.16 Global Water Governance: Future Water Studies in the context of global environmental change**

In the context of an integrated and nuanced view of hydrology that places people and power at the center of the water cycle, questions of how global governance needs to be reformed lie at the core of visions for future water governance. This lecture looks ahead at the developments in global water institutions and places particular attention onto the SDG process. Indeed, several SDGs relate directly to water – no. 6 “clean water and sanitation” and no. 14 “life below water” but also no. 12 “responsible production and consumption” or no. 9 “life on land” ... One could argue that water is connected to all of the SDGs, putting into perspective again the importance of future global water governance.

#### *Topics*

- (Missing) global water institutions
- Recent development: the water SDG process
- Global water governance

#### *Literature*

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## 2 Scholars in the field of (social) water studies

Bakker, Karen – Professor and Founding Director of the Program on Water Governance at the University of British Columbia’s Institute for Resources, Environment, and Sustainability. <https://karenbakker.org/>

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