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Study Guide

Academic Programme 2020-2022
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Programme Information: Water Management and Governance MSc Programme

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The Programme committee

Prof. M. Zwarteveen, PhD; Chair, Head and Coordinator Urban Waters Thematic Profile

H. Smit, PhD; Secretary, Programme Coordinator

Prof. P. van der Zaag, PhD; Member, Head and Coordinator River Basin Thematic Profile

Prof. J. Gupta, PhD; Member

Prof. K. Irvine, PhD; Member

E. Fantini, PhD; Member, MSc Research coordinator

J. Kemerink-Seyoum, PhD; Member, Coordinator Tailor Made Profile and deputy Programme Coordinator

J. Sehring, PhD; Member, Member, Coordinator Water Conflict and Diplomacy Specialization

E. de Jong, MA; Member, Senior Education Advisor

Student representative; Member

Introduction

The International Master programme in Water Management and Governance (WMG) provides a unique combination of knowledge, skills and competencies to help comprehensively analyse, critically reflect and effectively contribute to solve contemporary water problems. The question of how to balance objectives of social equity with those of ecological integrity and productivity are at the heart of societal efforts to deal and live with water. In answering this question, science and data are always deeply entangled with particular visions on development, moral worldviews, and economic or geopolitical interests. This is why the study programme pays explicit critical attention to the definition and workings of authority and power, and to the organisation of democracy in water. Because solutions to water problems always consist of a combination of engineering (infrastructure, technology), institutions (rules, laws, policies), and organisations, the WMG master programme brings together insights about water quality and quantity with understandings of the infrastructural, political and institutional arrangements to regulate its access, allocation, treatment, use and discharge. The courses on offer include engineering and natural science oriented courses (focusing on physical, biological or technical processes and design of water management solutions), social science oriented courses (including courses on water economics, politics and policy) and more skills-oriented courses aimed at acquiring the abilities to effectively 'do' WMG (law, conflict resolution, mediation, modelling, environmental assessment). Throughout the programme, there is a lot of attention to different ways of combining these different disciplines and sources of knowledge.

Academic and research skill development is an integral part of the programme's core learning objectives and activities. Skills that are taught and practiced throughout the programme include literature review, critical thinking, problem analysis, conducting research alone or in a team, groupwork and communication in written and oral forms. Other important skills that receive more attention are: interdisciplinary and integrated thinking, academic attitude and lifelong learning, problem solving, sound judgement and application of tools, methods and procedures (e.g. both institutional arrangements and models) in a given context. All these activities are well embedded within the core contents of the programme, which helps to maintain a strong link between the skills and knowledge (theory and application).

The programme's anchor are water problems as they are experienced by relevant actors (users, operators, policymakers, politicians, experts) in their everyday dealings with water. The applicability of taught practical and analytical skills for dealing with actual WMG situations is therefore the most crucial measure of their value. However, by deepening their insights about how socio-natural processes shape water flows and vice-versa, the programme not just provides tools to help solve problems, but also develops students' theoretical ability to critically compare and reflect on proposed solutions, measuring their effectiveness against wider environmental and social objectives.

An important target audience for the programme are mid-career water professionals from Southern countries: those already working in the water sector (either with governments, NGOs or the private sector), who aspire to improve their knowledge and skills. However, we also welcome students from other disciplinary and professional backgrounds (e.g. lawyers, journalists, entrepreneurs, activists) or countries of origin who aim to specialize in water, and we are open to less experienced students who are interested in studying at IHE Delft because it gives them a unique, broad and interdisciplinary background in contemporary WMG questions.

The programme's overall ambition is to train and educate reflexive water professionals and experts who have the knowledge and capacity to develop, plan, implement and evaluate WMG policies and strategies in support of the ecologically wise and socially equitable use of water.

In line with the overall IHE Delft's approach to education, the programme's contents are diverse: lectures by experts in the field are complemented by practical assignments, work in the laboratory, excursions and group-work. Innovative distance learning and electronic interactive educational tools support the programme. Throughout the educational cycle, lecturers and professors make creative use of opportunities to build on and learn from the rich experiences of students. More in general, the programme is student-centred, which means that students have a large degree of freedom to put together the curriculum that best fits their choice, interests and needs

Career

Graduates of the WMG programme start or resume a career with wide range of management and governance related positions in the water sector. Among others, alumni of the programme obtained jobs with:

- Public administration, including central and local governments (e.g. river basin organizations, urban water authorities, water boards, urban/rural development ministries/authorities).
- Private sector organizations (e.g. consulting firms, water supply companies, law firms).
- Academia and research institutes in the field of water and environment.
- At NGOs and international organizations (e.g. UN, World Bank, OAS).

Graduates with excellent study results are eligible to undertake a PhD in renowned universities in different countries.

Structure of WMG Programme

WMG is one of the five IHE's Master programmes. It is offered as an 18-month Master of Science (MSc) programme. The programme follows a modular structure, which is illustrated by Figure 1, also indicating the specific modules offered in the programme. The first year of the programme are taught modules that run from November to September. Then, starts the research phase of over six-months resulting in a thesis that is defended in May. The first year starts with four general modules in the **foundation phase**. These modules cover the different ways of understanding water and pay specific attention to interdisciplinary approaches.

During this foundation phase the students will, under guidance of a coach, identify their personal learning goals based on their professional background and career ambitions. Based on these goals, the students will select five modules that fit with their educational needs as part of their **tailor-made track**. The modules help to either broaden or deepen the student's understanding of specific management and governance issues, to strengthen interpersonal and research skills, and to learn how to apply the necessary tools relevant for water management and governance. To some extent modules can be selected from other MSc programmes. Students can also opt for a module that they design themselves, referred to as Capita Selecta, which may include an internship, project assignment or a mini-thesis. Instead of choosing an individual track, students can also opt for one of the thematic profiles for which specific

learning objectives are set and relevant modules are suggested. Currently the programme offers a thematic profile on River Basins and on Urban Waters.

In addition to the tailor-made track, all WMG students come together to test the knowledge, insight and skills acquired in the preceding modules in an interdisciplinary, problem-solving environment. Students will jointly conduct fieldwork in a European river basin to explore contemporary WMG issues. This phase also includes a module aimed to strengthen research and team work skills by carrying out an interdisciplinary research project based on the data collected during fieldwork. In addition, one week Summer Courses are offered on state-of-the-art topics such as water and gender, visual methods for water communication, nature-based solutions, serious gaming, water leadership, and advanced multi-stakeholder analysis.

Most of the modules have a duration of three weeks, and an examination period is scheduled after every two modules. Most modules are assessed through (group) assignments and (written or oral) exams.

After the taught part of the WMG programme, students develop their research proposal and follow research methodology course(s). After successful defence of the thesis proposal, research is conducted for a period of six months, which is dedicated to integrating and applying individual knowledge and skills through applied research in a field directly related to their personal interests, professional experience and context. The research topics can be selected and developed from the suggested topics by the staff members (as part of ongoing research projects) or proposed by the students, if applicable in consultation with their employers. The student play a leading role in conducting the research but do receive guidance throughout this **research phase** from a team of supervisor and mentor(s).

Upon successful completion of all the courses (taught and research part), the participants receive their Master of Science Degree in WMG, with possibility of specific mention of thematic profile followed.

	Modules for Water Management and Governance MSc Programme 2020-2022		
week	Phase	Module #	Module Name
		Module 0	Coaching
45	Foundation	Module 1	Introduction to Water and Development (1 week)
46-50		Module 2	What and who makes WMG expertise (5 weeks)
51		exam week	
1		Module 1 cont.	Introduction to Water and Development - Cntd (1 week)
2-4		Module 3	Water Resources Management
5-7		Module 4	Water Governance
8		exam week	
	Tailor-made tracks	Moule 5 (choose module*)	5a Water and Environmental Law
9-11			5b Managing Water Organisations
			Any other choice (e.g. other IHE Programmes)
		Moule 6 (choose module*)	6a Water Resources Assessment & Modelling
12-14			6b Analyzing Water Use Practices - Institutional analysis
			Any other choice (e.g. from other IHE Programmes)
15		exam week	
16-18		Moule 7 (choose module*)	7a Water Economics and Finance
			7b Water Conflict and Cooperation
			Any other choice (e.g. from other IHE Programmes)
19-21		Module 8 (choose module*)	8a Rethinking urban water supply, sanitation and drainage
			8b Water Resources Planning
			8c Water Conflict Management and Tools for Water Diplomacy
			Any other choice (e.g. from other IHE Programmes)
22		exam week	
23-25	Integration & Interdisciplinarity	Module 9	Field Trip
26-28	Tailor-made tracks	Module 10 (choose module*)	10a Remote Sensing for Water Resources Management
			10b Partnerships, Networks and Stakeholder Analysis in the Water Sector
			Capita Selecta
			Any other choice (e.g. from other IHE Programmes)
29-31		Module 11 (choose module*)	11 Sustainability and Resilience of Water Organizations
			Remote Sensing for Agriculture
			Strategic Planning of River Basins and Deltas
			Capita Selecta
			Any other choice (e.g. from other IHE Programmes)
32		exam week	
33		holiday	
34		Module12	*Various Summer Courses on offer*
35-37	Integration & Interdisciplinarity	Module 13	Research project
38		exam week	exam week
39-43	Research	Module 14	MSc proposal
44		exam week	MSc proposal defenses
from 45		Module 15	MSc Thesis Research and Thesis Writing
	* Every participant may choose maximum 2 modules from other programmes that are not listed above		

Figure 1. A schematic view of the WMG programme organization, highlighting distinct phases and modules.

Final Qualifications WMG Programme

Graduates in the MSc programme in Water Management and Governance have the ability to:

Knowledge and understanding

1. Place the specialized knowledge gained into a broader understanding of water issues, challenges, debates and developments.
2. Analyse biophysical and social processes and appraise principles and approaches relevant to water management and governance.
3. Recognize and distinguish different ways of knowing and framing water questions and problems in order to analyse water management and governance processes from an interdisciplinary perspective.

Applying knowledge and understanding

4. Draft a research plan, including the formulation of research questions and hypotheses and the selection of research methods, theories and techniques.
5. Conduct research independently in a scientifically sound and ethically responsible manner.
6. Contribute to interdisciplinary and evidence-based knowledge development and problem solving.
7. Analyse and contextualize governance arrangements and (integrated) management approaches to address water issues in socially inclusive and ecologically sustainable ways.

Making judgements

8. Identify and appraise relevant research, concepts and approaches in view of their potential for helping understand or solve water-related problems.
9. Critically discuss and evaluate own research approaches and outcomes within the context of existing knowledge and approaches.
10. Interpret research findings critically in order to formulate evidence-based conclusions, solutions and/or recommendations.
11. Reflect critically on the implications of water management and governance interventions on society and nature and formulate and defend own standpoint.

Communication

12. Communicate and present effectively, both in writing and orally, making use of information and communication technologies suited for the audience and the purpose.
13. Debate and defend findings and insights, in a clear, systematic and convincing manner.
14. Communicate effectively across disciplines and cultures to enhance collaborations in teams.

Lifelong learning skills

15. Develop competencies required to further expand their knowledge and skills on their own initiative.
16. Reflect on own professional and educational background in order to identify a personal learning trajectory to realize career objectives and professional development goals.

Thematic Profiles

Thematic profile: River Basins

The thematic profile on River Basins studies the way water flows through river basins and how water availability and water needs of various kinds of water sectors and users are matched, including nature and cities. This profile also studies the implications of land use and water allocation policies and interventions at different scales, and develops skills to critically reflect on legal and institutional arrangements from the local watersheds to the (transboundary) basin scale and beyond, particularly in view of sustainability and equity in water distributions.

The suit of modules offered in this path will prepare the students to:

1. Describe for a given river basin the water flows across time and space, including the various water uses, and analyse the interdependencies and/or competing interests these create between the various water users.
2. Analyse water related legal and institutional arrangements and interventions and critically reflect how these affect equity and sustainability in the distribution of water in the basin.
3. Describe and predict for a given river basin the main hydrological, hydraulic, chemical and ecological processes and how these processes are dynamically linked with human activities, including land and water use.
4. Model processes of the water system (rainfall-runoff, flooding, water allocation, water accounting), validate models, critically interpret model outcomes in order to derive insight in trends, causes and effects, and define and explain model limitations.
5. Describe different concepts to determine the value of water for various uses and users in (amongst others) economic and social terms and explain how these concepts can be used in water resources planning at various spatial and temporal scales.

Students who opt for the thematic profile on River Basins are expected to carry out MSc thesis research on a related topic and select from the following list of modules:

#	**River basin path**
1-4	*Foundation phase*
5	Water and Environmental Law or Managing Water Organizations
6	Water resources assessment and modelling or Analysing water use practices – Institutional analysis
7	River basin modelling (WSE) or Water economics and finance or Water conflict and cooperation

8	Water resources planning or Water conflict management and tools for water diplomacy
9	*International fieldtrip*
10	Remote sensing for water resources management or Applied groundwater modelling (WSE) or Drought management and reservoir operation (WSE) or Capita Selecta
11	Strategic Planning for River Basins and Deltas (ES) or Remote Sensing for agriculture (WSE) or Hydroinformatics for decision support (WSE) or Capita Selecta
12	Summer courses
13	*Research project*

Thematic Profile: Urban Waters

The thematic profile on Urban Waters studies the way different kinds of water flow through urbanized environments and how these water flows are distributed to various groups of people across time and space. This profile also studies policies and business models for the provision of water and sanitation services through the analysis of organizational, infrastructural and financial arrangements in different socio-economic contexts. Moreover, students are expected to develop skills to design and reflect on arrangements for water service provision and water development interventions, with a particular focus on addressing equity and sustainability issues.

The suit of modules offered in this path will prepare the students to:

1. Analyse for a given urban settlement how the different kinds of water (e.g. drinking water, waste water, floodwater) flow through the urbanized environment and how these water flows are (historically) distributed to different neighbourhoods and/or various groups of people.
2. Describe different modalities for water supply and sanitation service provision and relate debates on these modalities to the management of water providers using theories from different academic disciplines (e.g. economics, public administration, sociology, political science, law).
3. Analyse various approaches and tools water service providers can employ in order to improve the sustainability, equitability and/or resilience of their practices.
4. Design and assess water and sanitation service arrangements in different socio-economic, political and administrative contexts.

5. Analyse how the urban water flows are connected to flows in the river basin and beyond, and critically reflect on the implications of urbanization on flows of water at various spatial and temporal scales.

Students who opt for the thematic profile on River Basins are expected to carry out MSc thesis research on a related topic and follow the modules:

#	**Urban waters path**
1-4	*Foundation phase*
5	Managing Water Organizations or Water and Environmental Law
6	Analysing water use practices – Institutional analysis
7	Water conflict and cooperation or Water Economics and Finance
8	Rethinking urban water supply, sanitation and drainage or Water conflict management and tools for water diplomacy
9	*International fieldtrip*
10	Partnerships, networks and stakeholder analysis in the water sector or Urban water systems (UWS) or Capita Selecta
11	Sustainability and Resilience of Water Organizations or Water Sensitive cities (WSE) or Strategic Planning for River Basins and Deltas (ES) or Capita Selecta
12	Summer courses
13	*Research project*

Academic Staff

Module coordinators

WMG01	Introduction to Water and Development (1 week)	Sehring and Kooy
WMG02	What and who makes WMG expertise (5 weeks)	Smit and Van Cauwenbergh
WMG03	Water Resources Management	Seyoum
WMG04	Water Governance	Kemerink-Seyoum and Acevedo Guerrero
WMG05a	Water and Environmental Law	Schmeier and Cuadrado Quesada
WMG05b	Managing Water Organisations	Schwartz
WMG06a	Water Resources Assessment & Modelling	Mul
WMG06b	Analysing Water Use Practices - Institutional analysis	Smit and Kemerink-Seyoum
WMG07a	Water Economics and Finance	Jiang
WMG07b	Water Conflict and Cooperation	Schmeier
WMG08a	Water is wide: Rethinking urban water supply, sanitation and drainage	Acevedo Guerrero
WMG08b	Water Resources Planning	Van Cauwenbergh
WMG08c	Water conflict management and tools for water diplomacy	Sehring
WMG09	International Fieldwork	Schwartz and Cuadrado Quesada (tbc)
WMG10a	Remote Sensing for Water Resources Management	Salvadore and Michailovsky
WMG10b	Partnerships, Networks and Stakeholder Analysis in the Water Sector	Boakye-Ansah and Hermans
WMG11a	Sustainability and Resilience of Water Organizations	Schwartz
Module 12	*Various Summer Courses on offer*	
WMG13	Research Project	Susnik and Schwartz
WMG14	Thesis proposal development and research methods for WMG	Fantini
WMG 15	MSc Thesis Research and Thesis Writing	Fantini

Academic Staff involved in Water Management Governance Programme

Staff members closely involved in the WMG programme				
#	**Name**	**Degree**	**Position**	**Expertise**
1	Zwarteveen, M.	PhD	Professor	Water Governance
2	Van der Zaag, P.	PhD	Professor	Water Management
3	Gupta, J.	PhD	Professor	Water and Environmental Law
4	Irvine, K.A.	PhD	Professor	Aquatic Ecosystems
5	Jaspers, F.G.W.	MA	Associate Professor	Water and Environmental Law
6	Schwartz, K.	PhD	Associate Professor	Water Services Management
7	Kooy, M.	PhD	Associate Professor	Urban Water Governance
8	Kemerink, J.S.	PhD	Senior Lecturer	River Basin Governance
9	Van Cauwenbergh, N.	PhD	Senior Lecturer	Water Resources Planning
10	Susnik, J	PhD	Senior Lecturer	Water Resources Modelling
11	Jiang, Y.	PhD	Senior Lecturer	Water Economics
12	Evers, J.	PhD	Senior Lecturer	Environmental Policy and Planning
13	Mul, M.	PhD	Senior Lecturer	Water Resources Management
14	Sehring, J.	PhD	Senior Lecturer	Water Diplomacy
15	Schmeier, S.	PhD	Associate Professor	Water Law and Diplomacy
16	Guerrero, T.A.	PhD	Senior Lecturer	Sanitation and Wastewater Governance
17	Fantini, E.	PhD	Senior Lecturer	Water Governance
18	Michailovsky, C	PhD	Lecturer	Water Accounting
19	Salvadore, E.	PhD	Lecturer	Water Accounting
20	Seyoum, S.	PhD	Lecturer	Water Accounting
21	Smit, H.	PhD	Senior Lecturer	Water Governance
22	Shubber, Z.	MA, MSc	Lecturer	Law and Water Diplomacy
22	Boakye-Ansah, A.	PhD	Lecturer	Water Services Management
23	Quadrado Quesada, G.	PhD	Postdoc	Water Law and Groundwater Governance

Other staff members involved in the WMG programme				
#	**Name**	**Degree**	**Position**	**Expertise**
1	Zevenbergen, C.	PhD	Professor	Flood Resilience of Urban Systems
2	Wehn, U.	PhD	Associate Professor	Water Innovation Studies
3	Popescu, I.	PhD	Associate Professor	Hydroinformatics
4	Douven, W.J.A.M.	PhD	Associate Professor	Integrated River Basin Management
5	Van der Steen, P.	PhD	Associate Professor	Environmental Technology
6	Gettel, G.	PhD	Senior Lecturer	Aquatic Biogeochemistry
7	Stigter, T.	PhD	Senior Lecturer	Hydrogeology and Groundwater Resources
8	Raj, E.	PhD	Senior Lecturer	Resource Recovery Technology
9	De Ruyter, E.	PhD	Senior Lecturer	Aquatic and Marine Ecology
10	Van Bruggen, J.J.A.	PhD	Senior Lecturer	Microbiology
11	Van Dam	PhD	Senior Lecturer	Ecological & Environmental Modelling
12	Van der Kwast, H.	PhD	Senior Lecturer	Ecohydrological Modelling
13	Wenninger, J.	PhD	Senior Lecturer	Hydrology
14	Ferrero, G.	PhD	Senior Lecturer	Water Supply Engineering
15	Mendoza-Sammet, A.M.	PhD	Lecturer	Environmental Planning and Management
16	Hes, E.M.A.	MSc	Lecturer	Environmental Systems Analysis
17	Darvis, L.P.	MA	Librarian	Plagiarism, literature search
18	Kruis, F.	BSc	Head Laboratory	Laboratory work
19	Masia, S.	PhD	Postdoc Researcher	Water Systems Modelling
20	Masih, I.	PhD	Senior Lecturer	Water Resources Planning
21	Hermans, L	PhD	Associate Professor	Environmental Planning and Management