Water Management

UNESCO-IHE
Institute for Water Education

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Contents

This report was finalised on 11 December 2012

Report on the master's programme Water Management of the UNESCO-IHE Institute for Water Education, Delft

This report takes the NVAO's Assessment Framework for Limited Programme Assessments as a guiding document.

Administrative data regarding the programme

Master's programme Water Management

Name of the programme:	Water ManagementWater Management
CROHO number:	75008
Level of the programme:	master of science
Orientation of the programme:	academic
Number of credits:	106 EC
Specialisations or tracks:	The programme offers the following specialisations: • Water Quality Management; • Water Resources Management; • Water Services Management; • Water Conflict Management.
Location:	Delft
Mode(s) of study:	full-time
Expiration of accreditation:	31-12-2013

The visit of the assessment committee to the UNESCO-IHE Institute for Water Education took place on 17-19 September 2012.

Administrative data regarding the institution

Name of the institution:	UNESCO-IHE Institute for Water Education
Status of the institution:	(partly) publicly funded institution
Result institutional assessment:	pending

Quantitative data regarding the programme

The required quantitative data regarding the programme are included in Appendix 6.

Composition of the assessment committee

The committee that assessed the master's programme Water Management consisted of:

- Prof. dr. André van der Beken (chair), emeritus professor, Free University Brussels, Belgium;
- Prof. ing. Janos Bogardi, professor in Water Resources at the Faculty of Agriculture of the University of Bonn, Germany;

- Academician Dipak Gyawali, professor at the Nepal Academy of Science and Technology (NAST), Nepal;
- Prof. dr. Rivka Kfir, extraordinary professor Microbiology and Plant Pathology and senior advisor at the Water Institute, University of Pretoria, South Africa;
- Prof. dr. Grietje Zeeman, professor in New Sanitation at Wageningen University and Research Centre (WUR), the Netherlands;
- Franca Kramer BSc, master student of Water Management at Delft University of Technology, the Netherlands.

Appendix 1 contains the CV's of the members of the committee.

The committee was supported by Adrienne Wieldraaijer-Huijzer M.A., QANU staff member and project leader, and by dr. Marianne van der Weiden who acted as the committee's secretary.

All members of the committee and the secretary signed a declaration of independence as required by the NVAO protocol to ensure that the committee members judge without bias, personal preference or personal interest, and the judgement is made without undue influence from the institute, the programme or other stakeholders (see Appendix 8).

Working method of the assessment committee

Preparation
Upon receiving the critical reflection of the master's programme Water Management (WM) on 29 June 2012, QANU checked the critical reflection to ensure that it could serve as the key document informing the assessment. A revised version, received on 16 July 2012, was found to fulfil the criteria of relevance and completeness. Copies of the critical reflection were then sent to the members of the assessment committee.

In addition to the critical reflection, the committee received eight recent student's theses from the WM programme. This was done based on a pre-selection of the ten from the list of theses in the critical reflection. The theses evaluated by the committee covered the full range of marks: included in the sample were theses with a low mark (6.0-6.9), with an intermediate mark (7.0-8.4) and with a high mark (8.5-10). The committee members used QANU's checklist for the assessment of theses to ensure that their assessments were comparable and covered the relevant aspects.

Prior to the site visit, the project leader met with representatives of the UNESCO-IHE Institute and agreed on the programme for the site visit and the associated practical arrangements. The programme included consultations with staff members and students and both groups were informed about the opportunity to speak to the committee confidentially during the visit.

Site visit
The site visit took place on 17, 18 and 19 September 2012. The detailed programme of the site visit is presented in Appendix 2. It started with a preparatory meeting, in which the committee members discussed the critical reflections and the theses they had received prior to the site visit. The committee also discussed and agreed on the questions and issues to be

discussed during the interviews with representatives of the programme, students and other stakeholders.

The committee conducted interviews with the management of the institute, students, lecturers, alumni, members of the Programme Committee (the equivalent of the Education Committee), the Examination Board, the student counsellor and the alumni officer. In addition, the members of the committee studied supplementary materials made available by the programme management. An overview of this documentation is given in Appendix 7.

The site visit was extended by half a day to allow for the assessment of the proposed joint degree programmes. The committee studied additional documents that were made available by the programme management, relating to the structure of the joint degree programmes and their management, the cooperation agreements, joint exam regulations and detailed module and course descriptions. Interviews with the partner institutes were arranged through Skype and telephone conferencing. In its deliberations the committee paid separate attention to the assessment of the joint degrees.

The committee conducted a concluding interview with the management, followed by a committee internal meeting. During this meeting the committee discussed its findings, formulated its conclusions and gave its assessment of the standards of the assessment framework. Finally, the chairman of the committee presented the committee's preliminary findings to staff and students of the institute.

Report
Following the site visit, the committee secretary composed a draft report. Thereafter, the report was studied by all committee members who provided further comments and insights to the secretary. The secretary processed all corrections, remarks and suggestions for improvement provided by the committee members to finalise the preliminary report which was submitted to QANU. QANU's secretariat sent this version to the UNESCO-IHE Institute, inviting them to check it for factual errors, inaccuracies and inconsistencies. The secretary forwarded the comments and suggestions provided by the Institute to the chairman of the committee, and, where necessary, to the other committee members. The committee decided whether the comments and suggestions were to be incorporated in the report or ignored. On the basis of the committee's decisions, the secretary compiled the final version of the programme report.

Decision rules
In accordance with the NVAO's Assessment Framework for Limited Programme Assessments, the committee used the following definitions for the assessment of both the standards and the programme as a whole.

Generic quality
The quality that can reasonably be expected in an international perspective from a higher education bachelor's or master's programme.

Unsatisfactory
The programme does not meet the current generic quality standards and shows serious shortcomings in several areas.

Satisfactory
The programme meets the current generic quality standards and shows an acceptable level across its entire spectrum.

Good
The programme systematically surpasses the current generic quality standards across its entire spectrum.

Excellent
The programme systematically surpasses the current generic quality standards well across its entire spectrum and is regarded as an (inter) national example.

The default assessment is 'satisfactory', i.e. the programme complies adequately with the criteria.

Summary judgement regarding the quality of the master's programme Water Management

The judgement of the assessment committee is based on information provided in the critical reflection, a sample of theses, additional documentation provided during the site visit and interviews conducted with staff, students and graduates of the programme. During its assessment, the committee noted positive aspects as well as ones which could be improved. Taking these aspects into consideration, the committee decided that the programme in Water Management **fulfils the requirements** set by the NVAO for accreditation.

Standard 1: Intended learning outcomes
UNESCO-IHE is a development oriented institute of higher education and the Master Water Management is one of the four master's programmes offered to mid-career professionals from around the world. Water Management is an interdisciplinary field, combining and integrating natural and social sciences. It offers four specialisations: Water Quality Management (offered together with the master's programme in Environmental Sciences), Water Resources Management, Water Services Management and Water Conflict Management. An international benchmark has been executed by the programme and shows that the contents of the programme are in line with other programmes in the Netherlands and Europe, but that its special niche is the target group of mid-career professionals, its development orientation and the diverse background of the students who enrol in this programme (a large part are BA graduates in public administration, law or economy).

The learning objectives of the programme specify the acquirement of scientific knowledge and understanding of natural and social sciences, the application of this knowledge in engineering and management contexts, the ability to conduct research on the basis of a good research plan and appropriate methodologies, and the skills to communicate the results of research to colleagues and stakeholders, both orally and in writing. The formulation of the intended learning outcomes testifies to its ability to successfully navigate between applied and academic science. The consequential hybrid character of the programme is distinctive and challenging and considered most appropriate for a field such as Water Management. The committee therefore assesses the first standard as **good**.

Standard 2: Teaching-learning environment
The curriculum consists of 106 ECTS and runs over 18 months. The programme follows a modular structure, each module having a duration of three weeks and a study load of 5 EC. It has four distinct phases: Foundation, Specialisation, Integration and Research. The institute has used the T-shape model in designing the curriculum. In this model the vertical bar of the letter T represents the in-depth knowledge of the main discipline and the horizontal bar reflects the basic knowledge of adjacent disciplines. The students appreciate the effect of the programme in first broadening their scope and then focusing again.

The didactical concept of the Water Management programme is student-centred and aims to stimulate the student's independent and active learning attitude and intellectual growth. The learning objectives are described in clear module sheets. Each module uses a variety of teaching and assessment methods, depending on the goal of the course. This may include laboratory work, lectures, self-study, field trips, small group assignments and individual exams. Lectures are given by UNESCO-IHE staff and by guest lecturers who provide additional theoretical expertise and examples from the professional field. The committee suggests that as the number of guest lecturers is large the programme should pay careful attention to their briefing and coordination.

Students find the study load demanding. A large volume of material has to be covered and the material addresses a wide range of disciplines. Since many students have not been in class for years, it makes it more demanding. Especially the work on the research project is difficult for many students because only few of them have a research background. However, it is noted that the guidance and supervision during the research phase are intensive to give the students the necessary support.

The academic staff is well-qualified academically and professionally, and has good teaching skills. They are also highly committed. Their international background and experience fit the scope of the programme and the contexts of the students. For additional input guest lecturers are called upon. The Student Office offers non-academic support in a proactive manner and well-coordinated with the academic support by the Programme Coordinator and the Specialisation Coordinator. The committee recommends to establish for each incoming student a 'portfolio' with his/her initial motivation and career plan, which should be discussed and updated as needed, preferably with a unique mentor from the start.

The committee recognises the often intricate selection of the right candidates with the correct background. It recommends therefore to explore the possibilities for on-line preparation and self-learning opportunities through the e-Campus development. The committee acknowledges the effort to balance the appropriate level of the curriculum and its necessary flexibility within the constraints of the duration of the programme. The committee suggests to look into the possibility of offering a programme of 120 EC for all students and granting credits to incoming students with professional experience, comparable with an internship of 6 months.

The curriculum clearly reflects the T-shaped concept. For selected students with a BA background a special effort to prepare them prior to their arrival in Delft is highly recommended. The group work approach is a useful way to prepare future water leaders to face real-life problems. This approach as well as most of the curriculum allows for good interaction among students. An international exposure is given in field trips and site visits. The institute has well-staffed specific services and good facilities. The committee welcomes very much the vision of the Programme Committee to move towards a programme without distinctive specialisations, with a maximum flexibility to students based on their individual portfolio. The committee therefore assesses the second standard as **good**.

Standard 3: Assessment and achieved learning outcomes
The committee established that the assessment system of the UNESCO-IHE functions well. Good control mechanisms ensure that work is systematically and consistently graded. The committee further found the variety of assessment methods to be appropriate but with a predominance of written exams. More oral exams could contribute to the training of the students in communication skills. The examination structure has clearly been tailored to the intended learning outcomes of the programme. The committee especially appreciates the system of blind marking, the involvement of external assessors for the thesis and the principle that marks for a module or the thesis should not deviate too strongly from an 'average' mark. The assessment system has strong checks and balances and the assessments are transparent, valid and reliable.

The committee studied a representative sample of the Water Management theses. In most cases the committee agreed with the mark given by the thesis committees, but for a number of interdisciplinary theses the committee would have given a higher mark. The committee

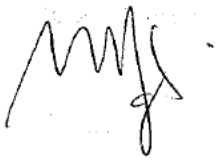
suggests to include an examiner, fully external to the Institute, in all theses committees. All theses met the minimum requirements for academic quality and some were at a much higher level. On this basis the committee concludes that the master's programme Water Management graduates have achieved the intended learning outcomes of an academic master. The positive effect of the master's programme was confirmed by the alumni with whom the committee met. The committee therefore assesses the third standard as **satisfactory**.

The committee assesses the standards from the assessment framework for limited programme assessments in the following way:

Standard 1: Intended learning outcomes	good
Standard 2: Teaching-learning environment	good
Standard 3: Assessment and achieved learning outcomes	satisfactory
General conclusion	**satisfactory**

The chair and the secretary of the committee hereby declare that all members of the committee have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 11 December 2012



Prof. dr. André van der Beken

Dr. Marianne van der Weiden

Description of the standards from the Assessment Framework for Limited Programme Assessments

Structure and mission of the institute
The UNESCO-IHE Institute for Water Education was established jointly by UNESCO and the Government of the Netherlands in 2003 as a UNESCO 'category I' institute. The Institute carries out research, education and capacity building activities in the fields of water, environment and infrastructure. UNESCO-IHE continues the work that began in 1957 when IHE first offered a postgraduate diploma course in Hydraulic Engineering to practising professionals from developing countries.

UNESCO-IHE envisions a world in which people manage their water resources sustainably and in which all sectors of society, particularly the poor, can enjoy the benefits of basic water services. Its mission expresses a commitment to generating and sharing knowledge, training water leaders and building capacity all over the world.

Whilst UNESCO-IHE is involved in its own research and education on the Delft premises, it is also instrumental in strengthening the efforts of other universities and research centres throughout the world, which increase the knowledge and skills of professionals working in their respective water sectors.

UNESCO-IHE offers four master's programmes, partly with international partner institutes:

- Master Water Management;
- Master Municipal Water and Infrastructure;
    - Including double degree programmes with KNUST, Ghana; UniValle, Colombia; AIT, Thailand*;
- Master Water Science and Engineering;
    - Including double degree programmes with UniValle, Colombia; Ain Shams University, Egypt; Haramaya University, Ethiopia; AIT, Thailand; Sriwijaja University, Indonesia; Technical University Dresden, Germany; Barcelona Tech, Spain; University of Ljubljana, Slovenia (Erasmus Mundus); University of Algarve, Portugal; University of Lodz, Poland; University of Kiel, Germany (Erasmus Mundus);
    - Including specialisations together with Hohai University, China;
- Master Environmental Science;
    - Including double degree programmes with AIT, Thailand*; UniValle, Colombia; ICT, Prague; University of Ghent, Belgium (Erasmus Mundus)*; BOKU, Austria; Egerton, Kenya*.

* UNESCO-IHE intends to change four double degrees into joint degrees.

Characteristic for the institute is its combination of applied research and advisory work, its multidisciplinary and international staff and its teaching programmes for an international student body.

Standard 1: Intended learning outcomes

The intended learning outcomes of the programme have been concretised with regard to content, level and orientation; they meet international requirements.

Explanation:
As for level and orientation (bachelor's or master's; professional or academic), the intended learning outcomes fit into the Dutch qualifications framework. In addition, they tie in with the international perspective of the requirements currently set by the professional field and the discipline with regard to the contents of the programme.

1.1. Findings

This section deals with the mission of the programme (§1.1.1), the domain-specific framework of the field of water management (§1.1.2), the educational objectives (§1.1.3), the level (§1.1.4) and benchmarking of the programme (§1.1.5).

1.1.1 Mission of the programme

The critical reflection states that the master's programme in Water Management aims at strengthening the capacity of the water sector to achieve interdisciplinary approaches by educating professionals, including civil servants of (local) governments, staff of non-governmental organisations, private sector employees and people working in academia. The programme targets mid-career professionals who have at least three years of working experience in water management or in related fields.

The programme builds on the recognition that:

- Water plays a key role in the natural and human environment;
- Decisions by water resource planners and developers can have far reaching consequences for society and the environment;
- Efficiency, social equity and ecological integrity of natural resources use can only be achieved through an integrated approach involving a variety of disciplines including engineering, ecology, law, governance and management.

1.1.2 Domain-specific framework

Central to the Water Management domain is the concept of Integrated Water Resources Management (IWRM) and the aim of developing and managing sustainable water resource systems as defined by the American Society of Civil Engineers (ASCE, 1998). More recent, the political contested nature of water management has gained emphasis in the domain including critical views on the concept of IWRM.

The domain, as described in the critical reflection, concerns the utilisation and conservation of water resources and the associated infrastructural, organisational and institutional arrangements. The competence of water managers combines a sound understanding of water availability in terms of quality and quantity and hence of key biophysical and hydrological processes, and the ability to quantify the uses and requirements of water by humans and the environment, with a critical understanding of legal, institutional, economic and other arrangements that regulate access, allocation, treatment, use and discharge of water. The four sub-domains in the programme are thus Water Quality Management (offered together with the master's programme in Environmental Sciences), Water Resources Management, Water Services Management and Water Conflict Management.

The Water Management domain is interdisciplinary by nature. It builds on natural sciences (physical, biological, technical and engineering), social sciences (legal, social, political, economic, financial, institutional and managerial) and the integration between biophysical and social processes. Domain-specific interdisciplinary tools and methodologies are being developed, tested and evaluated. The critical reflection mentions new concepts and emerging issues such as the use of social media in stakeholder participation, integrated modelling for multiple uses of water resources, the concept of 'waterscapes', multiple modes of water governance, the payment for environmental services in view of upstream downstream asymmetries and global changes including climate change.

A more elaborate description of the domain-specific framework, derived from the critical reflection, can be found in Appendix 3.

1.1.3 Educational objectives of the programme

The final qualifications for the master's programme in Water Management are described in terms of the Dublin descriptors and are listed in the critical reflection as follows:

Knowledge and understanding

1. knowledge of current theory and contemporary developments in Water Management;
2. the ability to describe the rationale for an integrated and interdisciplinary approach for managing water systems;
3. knowledge of biological, physical and chemical principles of water systems;
4. knowledge of economic, institutional and legal principles, approaches and instruments in water management;
5. understanding the broader scientific, engineering and socio-economic context and the role of other disciplines required for Water Management;

Applying knowledge and understanding

6. the ability to apply the knowledge and academic capabilities acquired, in management and engineering contexts;
7. the ability to contribute to managing water systems and organisations and to the development of institutional arrangements;
8. the ability to collect, analyse and organise relevant information and to draw sound conclusions;
9. the ability to prepare and implement a scientific research plan;
10. the ability to contribute to theoretical, methodological or applied developments within the field of study;

Making judgements

11. the ability to decide between different ideas and approaches independently, based on available information, and to assess the potential for application, integration and further development;
12. the ability to select and apply a variety of techniques, tools and procedures in order to evaluate the consequences of different development and intervention scenarios;
13. the ability to reflect critically on how different activities impact on the wise use of water;

Communication

14. the ability to report and communicate results clearly, and to explain and defend the reasoning, knowledge and assumptions to a variety of audiences;
15. the ability to function effectively in a multidisciplinary team;
16. the capability to assess interests among different stakeholders and to facilitate decision-making processes;

Learning skills:

17. the ability to extend and enhance one's own knowledge, insight and skills in a largely autonomous manner.

In an annex to the critical reflection these general learning objectives have been specified for the four specialisations in detailed and concrete learning outcomes. See appendix 4 for an overview.

1.1.4 Level

The programme aims to educate the students to an academic master's level. During the programme the graduates acquire knowledge of current theory and contemporary developments in water management, are able to enhance and apply this knowledge and academic skills in management and engineering contexts, and are actively prepared and stimulated to contribute to theoretical, methodological and applied developments.

They are being 'prepared, stimulated and challenged to think in multidisciplinary dimensions, to carefully study problems, to formulate appropriate questions, to design research approaches, to evaluate alternatives, to analyse results critically and to propose professional solutions and interventions.'

The ability to conduct research on the basis of well-formulated questions and appropriate methodology and to report its outcomes including recommendations and limitations in a scientific report is explicitly covered by the final qualifications of the programme.

1.1.5 Benchmarking

The final qualifications and the intended learning outcomes of the master's programme Water Management are, according to the critical reflection, broadly speaking in agreement with other multidisciplinary master's degree programmes:

- Water Management (Delft University of Technology, Delft, the Netherlands);
- Water Engineering and Management (University of Twente, the Netherlands);
- International Land and Water Management (Wageningen University, the Netherlands);
- Integrated Water Resources Management (WaterNet, University of Dar Es Salaam and University of Zimbabwe, Southern Africa);
- Water and Environmental Management (Loughborough University, UK);
- Water Management (Cranfield University, UK);
- Water Resources Engineering and Management (University of Stuttgart, Germany);
- Water Resources and Livelihood Security (Linköping University, Sweden);
- Water Security and International Development (University of East Anglia, UK).

All programmes mentioned above combine natural and social sciences and aim for integrated approaches in water management and for sustainable development. They are combinations of a taught part with a dissertation project and only admit candidates with a relevant bachelor's degree or equivalent undergraduate programme. Specific for the UNESCO-IHE programme is its mandate to train mid-career water professionals from around the world, including from developing countries and countries in transition. UNESCO-IHE therefore takes into account and assesses the work experience of applicants in the admission procedure.

1.2 Considerations

The committee fully subscribes to the mission of the programme. It is convinced that water management is a highly relevant and politically current issue that warrants the education and training of professionals who can contribute to what is needed. The interdisciplinary approach of the master's programme Water Management is not only a crucial element in the programme but also its main asset. By bringing together students from various disciplinary backgrounds, professional positions and countries UNESCO-IHE safeguards its interdisciplinary approach and its application. It allows students to internalise and apply this approach. The committee recognises this as the unique contribution of UNESCO-IHE, compared to other programmes on Water Management.

The strength of the programme is also its main challenge. The students are mid-career professionals who, mostly, have not studied for a number of years. They have to acquire academic and scientific working tools and skills while building the appropriate competence that will allow them to apply the knowledge acquired during their study in their work place. The programme provides foundation courses on a broad range of disciplines, from natural sciences to social sciences. As a consequence of the students' different backgrounds, different students will find the level of some of these foundation courses relatively easy while others are courses that do not form part of their background education and training and are found quite difficult. The introduction of a 'student portfolio' and the development of the e-campus concept will help to find appropriate student-tailored solutions. The committee compliments the programme management with the balance it has found between high academic standards, theoretical knowledge and practical applications, and between the various disciplines and methodologies. The consequential hybrid character of the programme is distinctive and challenging and considered most appropriate for a field such as Water Management.

The committee judges the final qualifications and learning objectives to be well-formulated. They clarify to staff and students what is expected from Water Management graduates in general and for its specialisations in particular. The learning objectives reflect the appropriate master level and are recognisably formulated in terms of the Dublin descriptors. They show the necessary focus on analytical and research skills for an academic master's programme.

1.3 Conclusion

Master's programme Water Management: the committee assesses Standard 1 as **good**.

Standard 2: Teaching-learning environment

The curriculum, staff and programme-specific services and facilities enable the incoming students to achieve the intended learning outcomes.

Explanation:
The contents and structure of the curriculum enable the students admitted to achieve the intended learning outcomes. The quality of the staff and of the programme-specific services and facilities is essential to that end. Curriculum, staff, services and facilities constitute a coherent teaching-learning environment for the students.

2.1 Findings

This section firstly covers the coherence and structure of the curriculum (§2.1.1). Subsequent paragraphs discuss the didactical concept (§2.1.2), study load (§2.1.3) and system of student guidance (§2.1.4). Finally, the composition of the academic staff (§2.1.5), the student body (§2.1.6) and the facilities (§2.1.7) are dealt with.

2.1.1 The curriculum

The master's programme in Water Management provides an overview of the major natural sciences and social sciences aspects of the multidisciplinary water management domain, including hydrological, biophysical, chemical, economic, institutional, legal, policy-making and planning aspects. Graduates must be specialists in their own field or discipline and also have a basic knowledge of adjacent and connecting fields. In order to achieve this UNESCO-IHE uses the T-shape model in designing the curriculum. In this model the vertical bar of the letter T represents the in-depth knowledge of the main discipline and the horizontal bar reflects the basic knowledge of adjacent disciplines.

The curriculum consists of 106 ECTS. Four specialisations are offered: Water Quality Management, Water Resources Management, Water Conflict Management, and Water Services Management. The programme follows a modular structure, each module having a duration of three weeks and a study load of 5 EC. An overview of the curriculum structure is given in Appendix 5. It has four distinct phases:

- Foundation;
- Specialisation;
- Integration;
- Research.

The foundation is the common basis at the start of the programme. Students follow four common modules for a broad state-of-the-art of water systems and water governance. Students are also exposed to different approaches in the field of water management and academic skills training.

The specialisation consists of six modules: three modules in the four specialisations to deepen the students' understanding of specific management issues and to provide them with the necessary tools; one common module on water and environmental law and two elective modules. The elective modules may be chosen from courses given by other master's programmes and may serve to broaden or deepen the student's knowledge. The possibility of elective modules with a more technical content (e.g. from the Environmental Science or the Municipal Water and Infrastructure Programmes) is most welcome.

In the integration phase students of the four specialisations come together in a multi-disciplinary problem-solving environment. There is a two-week international field trip in which students are exposed to current water management issues in southern Europe and trained in collecting biophysical and socio-economic data through fieldwork. This is followed by a three-week group work investigating management solutions for the same river basin using an integrated and development-oriented perspective.

In the research phase the students develop a research proposal, and follow an intensive course in research methodology and techniques and a variety of Capita Selecta courses on the latest developments in the field. In the final six months they conduct a research project. They are expected to integrate and apply their knowledge in a field directly pertaining to their professional experience, interest and context, often integrated within existing research lines of the institute.

The emphasis shifts gradually from theory to analysis, synthesis and integration. Students are increasingly challenged to apply the knowledge and theory acquired during the earlier parts of the programme, and analyse and synthesise this knowledge into concrete cases. This is evident during the field trip as well as during group work. The learning objectives, content and didactical approach are described in module sheets for each module. The committee found these of help for the students and for staff allowing the staff to further fine-tune of the programme curriculum. During the site visit the committee studied the learning materials and assignments for a selection of the Water Management modules. The committee found these modules to be well-designed and the literature was up-to-date and of an appropriate level.

The students expressed during their interviews great appreciation to the manner in which the programme first strives to broadening their scope and thereafter allows for focus. In the beginning students sometimes feel overwhelmed by the breadth of new subjects, i.e. the foundation modules, but later in the programme they understand how this initial width of material allows them to view the big picture and opens up new perspectives. The students value the combination of courses and do not see the need for major changes. They indicated that there was some overlap between courses but when they were asked for suggestions for improvement they said it was "mostly small things".

Students select the topic for their research project before the start of the elective modules. This allows them to adapt the choice of courses to their topic, which they greatly appreciate. To help the students select a research topic there is a thesis topics book. Students are also allowed to choose their own topic on condition that it meets the programme objectives. A monodisciplinary topic is discouraged but not forbidden. The staff finds it most important that a student is motivated and has passion for the topic. The committee recognises this as a valid argument, but warns that it raises the question about the strength of the T-shape model of the programme. The committee read theses that ranged from monodisciplinary to strongly interdisciplinary. Monodisciplinary topics are often easier to address but the committee advises the programme to stick to the T-shape model as much as possible, since this is one of the distinguishing features of the programme. Some students collect data and conduct their research in another country than their own, which broadens their view substantially and would therefore be preferred by the committee, but often a student and his/her employer want the research project to focus on their own country context. The fieldwork period is short, which makes it crucial to define the research question precisely. The students feel well prepared and supervised during the research project.

The committee discussed the contents of the programme with the Programme Committee. This committee carries the overall responsibility for the academic quality, content and organisation of the Water Management programme. The Programme Committee consists of the Programme Chair, Programme Coordinator, master's programme Research Coordinator, a Chair and a Coordinator for Water Resources Management, Water Services Management and Water Conflict Management and a Coordinator for Water Quality Management, a representative of the Water Services Management master's programme, student representatives per cohort and a representative of the Education Bureau. The Programme Committee is continually striving for a balance between all the topics that need to be addressed, including the economic and financial issues. On the basis of the information given, the committee concludes that these are well represented.

The Water Quality Management specialisation is shared with the master's programme Environmental Science. Students with a background in engineering or natural sciences are admitted to Water Quality Management in Environmental Science and those with a background in management or social sciences are accepted to Water Quality Management in Water Management. The difference is mainly in the foundation courses, which are shared with the Environmental Science or with the Water Management students.

The strategy of the Programme Committee regarding cooperation or crosslinks with other programmes within the institute or with other partners was discussed. The staff members explained that they seek cooperation in various forms, such as inviting lecturers from other UNESCO-IHE master's programmes, allowing students to select elective modules from other programmes within the institute, and allowing for joint supervisory teams for the thesis research projects. The joint Water Quality Management specialisation is a more formalised cooperation with shared modules. This is not extended to other master's programmes and to more modules because this is not expected to be efficient in other cases: in some programmes a module would be needed earlier in the programme than in others. The planning for staff availability may therefore be difficult.

There are links with other academic institutions. Two new modules on Negotiation and Mediation have been developed with the University of Dundee and the Clingendael Institute of International Relations. There are not yet concrete plans to develop double or joint degrees with other partners although the Programme Committee is exploring opportunities to do so in the near future. The staff believes that the field of Water Management is less developed and crystallised than some other areas and that there are as yet not many appropriate partners in the Global South to develop a common programme with. An additional argument against double or joint degree is the risk that they will draw the strongest students from developing or emerging countries to Delft and the staff prefer to rather replicate the Water Management master's programme in these countries or regions which will thus strengthen the local capacity.

2.1.2 Didactical concept

The didactical concept of the Water Management programme is student-centred and aims to stimulate the student's independent and active learning attitude and intellectual growth. Lectures are given by UNESCO-IHE staff members and by guest lecturers who can provide specialised expertise and a link with professional practice. In addition to the lectures there are field trips, laboratory and computer exercises and role-playing. The didactic methods chosen depend on the learning objectives of the module: exercise-based for the development of skills, small group assignments to stimulate integration of knowledge and lectures with individual assignments to impart knowledge and theory.

The staff informed the committee that for weaker students additional sessions and hand-outs are provided, for example in support to students attending the chemistry course. For interested students additional reading materials are offered.

The students were overall satisfied with the teaching methods. Their main concern was with regard to the number of guest lecturers. While the students found many of the guest lectures of high quality and a worthwhile addition to the contents of the modules, it seemed that some of the guest lecturers were not appropriately briefed about the input of other lecturers. This led to repetition and a lack of integration.

The Programme Committee explained to the committee that the input of guest lecturers was different per module. In some modules they provide essential and specific expertise that is not available within the institute, such as the input of the Clingendael Institute. In these cases the lecturers are also involved in the examination. In other modules guest lecturers are called in to provide illustrations. Sometimes their input is used in assignments with case studies but they are not involved in the examination of the students. Generally speaking, the involvement of guest lecturers is evaluated positively. The committee advises the programme to pay careful attention to the preparation and briefing of the guest lecturers, especially in modules with a large number of different guest lecturers.

Students learn also from each other, because of their different disciplinary and professional backgrounds. This is especially perceptible during the field trip and group work. These components are greatly appreciated.

The supervision and guidance during the research period is intensive. Each student is assigned a mentor who helps to select a topic and who keeps in touch during the fieldwork period. When the students return from the fieldwork they have weekly meetings with their mentor. These meetings are sometimes also attended by the student's supervisor to discuss the student's progress and the course of the research. In addition, thematic cluster meetings are organised on a weekly basis during which students present the research progress to their peers and their mentors as well as to other academic staff members. The students with whom the committee met during the site visit were in the stage of proposal writing and felt well guided. The alumni told the committee that especially this part of the curriculum is very demanding. Few students have a research background so that for most of them the thesis work leads to a "very steep learning curve", as one alumnus described it. Therefore they need much support.

2.1.3 Study load

The critical reflection indicates that the curriculum has a study load of 106 EC and has to be completed within 18 months. Most students succeed in completing the programme within this time period although almost all of them told the committee that it is a very full programme in which "assignments keep following you". For many students it has been a while since they were in class and it takes some time to get back into the rhythm of studying.

The alumni were of the opinion that the programme should not be made longer but that time should be utilised better. The foundation modules are useful but in their view these modules are too long. Since the different foundation modules are difficult or easy for different students, depending on their background, the alumni suggest that they should not be scheduled in blocks but parallel to each other, so that the workload is spread more evenly over the semester.

The Programme Committee is aware of the programme being heavy, but states that this is largely unavoidable. Because of the interdisciplinary nature of the programme and the different backgrounds of the students all courses are difficult for part of the students. The Programme Committee agrees that a longer programme with more content would be nicer and better, but that in practice this is not feasible, mainly for financial reasons such as the fellowship requirements. The committee agrees that in the circumstances they have found the best balance. The committee stresses the importance of the selection procedure of applicants and recommends the development of on-line preparation of selected candidates. The committee suggests to look into the possibility of offering a programme of 120 EC for all students and granting credits to incoming students with good working experience, comparable with an internship of 6 months.

Although time pressure remains a concern, the committee established that students do not generally perceive the study load as impossible. The curriculum may be demanding and leave little room for reflection, but it does not lead to many students dropping out of the programme. According to the lecturers, students are able to cope with the demands because they are highly motivated and strongly interested in the issues dealt with in the courses.

2.1.4 Tutoring and guidance

Because students at UNESCO-IHE come from different countries and cultures and mostly have no home base in the Netherlands, much attention is paid to the tutoring and guidance of the students.

In advance of their arrival they receive a Preparation Guide with practical information on travelling to and living in the Netherlands. Upon arrival they are given a Practical Guide about the services provided by UNESCO-IHE, about formal issues such as housing, immigration and health care, and about everyday life in the Netherlands. Information about the programme, its contents, rules and regulations and study-related facilities is provided in the Handbook that students receive at the start of the programme.

Non-academic support is given by the Student Affairs office. A student counsellor tries to help students in case of emotional problems such as homesickness or the effects of previous traumas. Students with study problems are in principle referred back to their Programme Coordinator or the Specialisation Coordinator, although in some cases the study counsellor is also involved. For academic support, all lecturers can be approached with questions. For the thesis research a staff member supervises the work of the student. In addition, during the thesis writing, each student has a mentor, a member of the academic staff of the chosen specialisation. The students are, generally speaking, satisfied with the role of the mentor. They note that the students are expected to take the initiative to contact the mentor if they need help. The committee concludes that the arrangements and facilities to support the students during their stay in the Netherlands are extensive and work properly. The committee recommends to establish for each incoming student a 'portfolio' with his/her initial motivation and career plan, which should be discussed and updated as needed, preferably with a unique mentor from the start.

2.1.5 Academic staff

The master's programme in Water Management is developed and delivered by a team of 49 UNESCO-IHE staff members and approximately 50 guest lecturers. For UNESCO-IHE staff members the staff/student ratio is 1:10.5 for the taught part and 1:23.6 for the master's programme supervision. For guest lecturers, who are involved in the taught part of the programme only, the ratio is 1:97.5.

The UNESCO-IHE staff is well qualified academically: all full professors have appointments at universities in the Netherlands, which testifies to their academic standing. The great majority of associate professors and lecturers hold PhD degrees. The publication record has increased substantially over the last years. Results of their research are used directly in the modules. In addition, all staff members and the guest lecturers have extensive and relevant professional experience in developing countries and in countries in transition. This experience ensures that the educational programme is tailored to the professional and institutional context of the countries of origin of the students. Finally, the teaching qualities of the staff members are evaluated positively by the students in the regular module evaluations. In their meeting with the committee during the site visit students described their relationship with staff members as open and that they appreciate the intensive guidance offered by the staff during the programme, especially in the research phase.

The committee considers the broad team of educational staff a strong point of the master's programme. Guest lecturers provide additional input in a very efficient and effective manner. However, as a considerable number of guest lecturers are involved in a module there is a risk of overlap and repetition. The committee advises that this will be coordinated more effectively in the future.

2.1.6 Student body

The Water Management programme attracts 20 to 30 students per year. The enrolment in the various specialisations fluctuates over the years and is influenced by the availability of fellowships. The group of students who fund their own studies has increased in the last five years up to 20% in 2011-2013.

The committee inquired if the student numbers per specialisation allow for sustainability. The Programme Committee partially clarified this by explaining that some modules are shared (for example the elective modules that can be selected by students from other master's programmes) and that others are also offered as short courses to non-master's students. The advantage of the small group size is, of course, the concentrated guidance of students that it allows.

The programme targets mid-career professionals with at least three years of working experience. This is reflected in the average age of the students: the largest group is 25-30 years old. The majority of students have a background in engineering (30-40%) or natural sciences (35-50%) while a much smaller group has a background in social sciences (10-30%). The students told the committee that the Master Water Management is exceptional in admitting students with a social science background to a programme with a strong engineering focus. For some of them this was the reason to apply for the master's programme given by UNESCO-IHE.

The students are very motivated and committed and work hard. For most of them a full time study requires quite an adjustment from the life they were used to. Their employer has allowed them a study leave and they are expected back with a degree after 18 months. The dropout rate is very low (0-5 students over the last five years) and the success rate is on average 90%.

2.1.7 Facilities

The facilities of the UNESCO-IHE institute are geared to the multidisciplinarity of the programmes. Well-equipped and well-staffed laboratories are used during the modules that focus on chemical analysis in the core part of the programme and in the Water Quality

Management specialisation. The classrooms and work spaces have recently been renovated. The videoconferencing room is an indispensable facility to allow for direct communication with partners overseas.

IT-facilities and the necessary software packages are available. Students receive a laptop at the start of the academic year and can purchase it for a reasonable price at the end of the programme. Wireless internet is available throughout the building. The library is used intensively by students throughout the programme and possesses a large amount of books and journals. The number of electronic journals has increased during the last years. In 2011 the e-campus project was launched, using the Moodle-software (Modular Object-Oriented Dynamic Learning Environment or Course Management System). Students and staff are supported by a Moodle-coordinator.

The committee is of the opinion that the UNESCO-IHE building offers very good facilities for the academic education of the students in an atmosphere that makes their stay in the Netherlands fruitful and enjoyable.

2.2 Considerations

After studying the various aspects of the programme's teaching and learning environment, the committee established that the contents and structure of the curriculum enable students to achieve the intended learning outcomes. The division of the curriculum into four distinct phases of foundation, specialisation, integration and research is logical and allows proper attention to both bars of the T-shape model of education: the vertical bar of specialisation and the horizontal bar of integration. This is in line with the interdisciplinary character of the programme. The timely selection of a research topic, the module in research methodology and the development of the research proposal prepare students for conducting their individual thesis research. The learning objectives per specialisation and the module descriptions are clear and provide insight into the contributions of curriculum components to the achievement of the intended learning outcomes of the master's programme. Overall, the committee is very pleased with the content of the curriculum. It is a creative and progressive programme, compared to other programmes in Water Management around the world. The courses are academic in orientation but also have applied characteristics required for the study of water management. Whenever possible, the results of the research activities and other projects of staff members are integrated in the curricula. Furthermore, the literature that is used is appropriate and up-to-date.

The main challenge of the curriculum is its density and the high level of intensity. The programme sets out to present a comprehensive 18-months training programme to a very heterogeneous body of students. The committee maintains that, within the limitations of this set-up, the programme management is doing well. In order to address the widely different levels of knowledge and skills with which the students enter the programme, the management has developed a set of foundation modules. The committee advises the staff to investigate alternative or additional possibilities, for example by expecting self-learning from the students before they commence their studies in Delft and by testing the students' basic knowledge on arrival. The development of the e-campus will be of great help for this purpose. Time should also be set aside for debate on general issues with staff and students from all specialisations, for example in seminars or evening lectures. Supporting students' adjustment is addressed by an extensive system of student monitoring, in which both the Programme Coordinator and the Specialisation Coordinator and the student counsellor play a role. This mechanism assures that potential problems are identified at an early stage. Because of the dedication of both staff and students, the programme in practice seems to work out well.

Staff members are highly motivated and involved, well qualified academically and seem to possess excellent teaching qualities. The core staff is strongly connected to the professional field in the Netherlands and abroad and brings extensive experience with applied research into the classrooms. This is clearly appreciated by the students. Guest lecturers are called in for additional specific expertise and as a link with the professional field. However, their input must be well coordinated to avoid overlap and repetition.

Traditionally, the student population of UNESCO-IHE is very diverse, in both academic qualifications and geographical background especially in this programme. As mid-career professionals on study leave they have, on the one hand, some difficulties at the start of the programme to adjust to being back in class but, on the other hand, they are highly committed and motivated to succeed.

2.3 Conclusion

Master's programme Water Management: the committee assesses Standard 2 as **good**.

Standard 3: Assessment and achieved learning outcomes

The programme has an adequate assessment system in place and demonstrates that the intended learning outcomes are achieved.

Explanation:
The level achieved is demonstrated by interim and final tests, final projects and the performance of graduates in actual practice or in post-graduate programmes. The tests and assessments are valid, reliable and transparent to the students.

3.1 Findings

This section firstly deals with the assessment system and quality monitoring of the thesis (§3.1.1) and with the achieved learning outcomes on the basis of the quality of the theses and the position of alumni on the labour market (§3.1.2).

3.1.1 Assessment system

The Education and Examination Regulations provide a detailed overview of the nature, frequency and marking of assessments as well as the possibilities for re-examination and appeal procedures. They are safeguarded by the Examination Board. All students are informed about the rules in the Handbook they receive at the start of the programme.

The assessments of the modules include written exams, oral exams, individual assignments such as essays and modelling exercises, and group assignments including the production of a documentary. Most modules include two or more methods of assessment to reflect the multiple intended learning outcomes of the modules. Group assignments never count for more than 50% of the final mark of a module, except for the IWRM Group Work module. To adequately reflect individual performance, student-peer assessments have been introduced within the more extensive group assignments to account for the performance of individuals within the group.

Students are informed about the assessment methods for each module in various ways. They are listed in the module sheets and are explained in more detail by the module coordinator at the beginning of a module, including the evaluation criteria that will be used for marking the various assessments. Written hand-outs with instructions are provided for assignments. Example exam questions are usually available for students of the module and tutorials are organised to practice the application of the knowledge in preparation for the exams.

Written exams are compiled by the module coordinator and peer-reviewed by the programme and/or specialisation coordinators. Marking is done anonymously based on student registration numbers. Oral exams are always conducted by at least two staff members to ensure impartiality. After each assessment students are given feedback on their performance and are given the chance to inspect their exams. Students are asked to evaluate the quality of the assessments in the module evaluations. Re-examinations normally take place during the next examination period indicated in the academic calendar. Students will not be allowed to sit for further re-examinations or reassignments if they failed more than three re-examinations for the first thirteen modules of the programme. An appeal procedure is in place and fraud or cheating is taken very seriously.

The assessment of the final thesis follows a procedure of four steps. First, the final version of the thesis is checked with modern software to minimise the chances of plagiarism. Second, for each thesis assessment an exam committee is established, consisting of the supervisor

(professor), the mentor and an external member from another department within UNESCO-IHE or from outside the institute. The composition of the exam committee has to be approved by the Examination Board. Third, the student presents and defends his/her thesis in an oral public defence. Fourth, the exam committee uses a list of evaluation criteria to grade the performance of the student, including the content, academic attitude and editorial aspects of the presented work. These criteria are listed in the Handbook and therefore known to the students. They are not yet cross-linked with the learning objectives of the programme. The Examination Board intends to do this next year. The committee considers this to be an important step, especially in view of the question whether the T-shape model of the programme is reflected clearly enough in the theses. Not all theses display the interdisciplinary focus of the programme.

There is no rule for the relative weight of the different criteria in the final mark of the thesis. This has been discussed among the staff but was viewed as a mechanistic approach that may be risky. Also, it was felt that this would not give sufficient freedom for the different roles in the exam committee, such as the mentor being focused on the process and the external examiner on the product. Although the committee agrees with this line of reasoning, additional mechanisms could add great value to the assessment of thesis. The committee recommends a rubric for assessment of master's theses. The thesis evaluation form should include a relative weight for the different criteria for assessing the final mark, which will enable a more objective assessment of the master's theses. Relative weights for thesis assessment are used in many universities in the Netherlands as well as other universities in Europe and other parts of the world.

The Examination Board safeguards the compliance with the rules set for the thesis assessments. The deadline for submission of the thesis in early April is clear to students and upheld quite strictly. Requests for extensions are handled by the Examination Board. The staff is responsible for the marks but the Examination Board supervises the outcomes on the basis of statistics and extreme grades. Decisions on distinctions are taken by the Examination Board and are based on the module marks and the thesis mark. Module marks and thesis marks differ quite often, and reflect that different skills are expected. Usually module marks are higher than the thesis marks. The use of an external examiner provides another reference point for addressing potential inflation of thesis marks and the granting of distinctions. The Examination Board also regulates assessment marks by comparing the outcomes of the different master's programmes and by benchmarking the average thesis marks with the Delft University of Technology, Wageningen University and the VU University of Amsterdam. To date, the grades allocated by the programme were at the same level.

The committee has studied the information on the assessment system and discussed the assessment system with the Examination Board. The committee also noted that students did not raise any issues about the assessment system or the individual assessments. The procedures as set and safeguarded by the Examination Board apparently ascertain a fair and transparent system. The various checks and balances oversee that the process of assessment is valid and reliable. The committee considers this to be a strong point. The link between the learning objectives of the programme and the marking of the thesis, to be made explicit in the near future, will further improve the assessment.

The committee investigated the diploma and diploma supplement that are issued after graduation. The diploma supplement contains the relevant information about the degree and the degree level, and includes the learning objectives of the chosen specialisation, the names of the modules and the marks that were earned, and the title and mark of the final thesis. The

committee concludes that this is a valuable and clear document that will help students in their future careers. Students who fail to meet the programme examination requirements will be issued a certificate stating the result achieved including the EC for each successfully completed component of the programme as well as the period of registration. Students who fail to meet the programme examination requirements and have accumulated a minimum of 45 EC will be awarded a 'certificate of post-graduate study'.

3.1.2. Achieved learning outcomes

The committee studied a representative sample of the Water Management theses. In most cases the committee agreed with the mark given by the programme staff, but in a number of cases the committee would have marked higher. This was especially the case in the multidisciplinary theses, where the committee felt that this effort and the outcome should have been more rewarded. All theses had clear objectives and problem formulation, an adequate selection and application of research methods, showed proper operationalisation and logical reasoning and followed the criteria for academic reporting. All of them were at least sufficient in these respects and some were at a much higher level. On this basis the committee concludes that the master's programme Water Management graduates have achieved the intended learning outcomes of an academic master.

The critical reflection describes that in 2010-2011 a tracer survey was held among 6,500 UNESCO-IHE alumni, to which 1,149 alumni responded. The respondents included 43 Water Management alumni who graduated between 2005 and 2010. The survey shows that the great majority (91%) continues to work in the water sector and that most (87%) remain employed in their home country or region. Almost half (46%) of the alumni are promoted after completion of their study, with about 27% becoming involved in middle or senior executive management. In their employment 81% of the alumni contribute to development oriented projects and 58% are involved in reform processes. The type of activities they are involved in shift increasingly to research, analysis and the dissemination of knowledge and information. The alumni officer informed the committee that each year a number of refresher courses is organised for the alumni.

These positive outcomes were confirmed by the feedback the committee received from a limited number of alumni. Their main asset after completing their UNESCO-IHE degree was that they felt prepared to work all over the world with very different people and on different topics. They found the interdisciplinary approach useful and were able to apply their knowledge across various sectors. UNESCO-IHE taught them to be critical and took them to a higher level, which helped them make further career moves. The programme builds up team work among the students and combines a practical approach with theoretical knowledge. The alumni described this as 'the beauty of the institute'. They admit that there may be engineering or scientific programmes with a stronger disciplinary reputation, but that the combination offered by UNESCO-IHE is unique and a better combination for developing countries. When asked for suggestions for improvement the alumni mentioned that the programmes should embrace new issues, such as interdisciplinary modelling. They also suggested that there should be more synchronisation among the master's programmes regarding the grading criteria for the theses. The committee agrees that UNESCO-IHE should always be alert to new developments to be addressed in its programmes. The committee advises the Examination Board to keep monitoring the grading criteria and grades for the master's theses.

3.2. Considerations

The committee established that the assessment system of the UNESCO-IHE functions very well. Good control mechanisms are ensuring that work is systematically and consistently graded. The committee further found the range of assessment methods to be sufficiently large. The examination structure has clearly been tailored to the intended learning outcomes of the programme. The committee especially appreciates the system of blind marking and the involvement of external assessors. The assessment system has strong checks and balances and the assessments are transparent, valid and reliable.

After studying examination results as well as a sample of recent theses, the committee established that graduates of the Water Management programme meet the end qualifications as specified under Standard 1. From the committee's conversations with alumni, it became sufficiently clear that graduates of the programme are truly able to function as capable water managers.

3.3. Conclusion

Master's programme Water Management: the committee assesses Standard 3 as **satisfactory.**

General conclusion

The committee has assessed two standards as good and the third standard as satisfactory. On the basis of the NVAO decision rules this means that the overall assessment of the programme is satisfactory. The committee judges the programme to be a stimulating academic master's programme. The well-defined profile of the programme, its position within the field, the clearly formulated intended learning outcomes, the coherent structure and interdisciplinary contents of the curriculum, the well-kept facilities, and the overall enthusiasm displayed by both staff members and students all contribute to a fitting teaching-learning environment. The assessment of the learning outcomes in tests, assignments and, above all, the master thesis meets the required quality standards. Both the quality of the theses and the experiences of the alumni show that the intended learning outcomes are achieved.

The committee assesses the *master's programme Water Management* as **satisfactory**.

APPENDICES

Appendix 1: Curricula vitae of the members of the assessment committee

Prof. dr. André van der Beken (chair) has been an emeritus professor at the Free University Brussels since 2003 after having been a full professor since 1979. In 1969 he obtained his PhD in Agricultural Sciences from the University of Ghent. He has been a visiting professor at the Technical University Delft, Dept. of Hydrology (1981-1982); the University of Dar es Salaam, Dept. of Civil Engineering, Tanzania (1983, 1986); the Institut National d'Agronomie de Tunisie, Tunis (1984-1987); the Faculty of Sciences and Technology, Universidad Major San Simon, Cochabamba, Bolivia (1986); WARREDOC, University for Foreigners, Perugia, Italy (1988); the master's programme in Eremology, University Ghent (1990-1996) and the Centre for Environmental Sanitation, University Ghent (1992 -2004). He has been the Director of the Interuniversity Post-graduate programme in Hydrology and a member of the Steering Committee of the Interuniversity Programme in Water Resources Engineering. André van der Beken was a member of the Peer Review Evaluation of the programmes of the Fonds National de la Recherche Luxembourg (2008-2010) and participated in the assessment of the education and training needs of the water resources management services of the Republic of South Africa (1998).

Prof. ing. Janos Bogardi has been a co-opted professor in Water Resources at the Faculty of Agriculture of the University of Bonn, Germany since 2004. He obtained his PhD (dr. ing.) in Water Resources Management from the University of Karlsruhe in 1979. He has been the Executive Officer of the Global Water System Project of ESSP since 2009 and Senior Fellow since 2010, both at the Center of Development Research of the University of Bonn. Previously he was Director of the Institute for Environment and Human Security of the United Nations University (UNU-EHS) (2003-2009), including the vice-rectorship of the UNU in Europe from 2007 until 2009; worked as a Senior Programme Specialist and Chief of Section at UNESCO, Paris (1995-2003); as a professor at the Agricultural University of Wageningen, the Netherlands (1989-1995) and as an Associate Professor at the Asian Institute of Technology (AIT) in Bangkok, Thailand (1985 – 1988).
He is a member of the Deutsches Komitee für Katastrophenvorsorge (member of the board 2009-2011), of the International Association of Hydrologic Engineering and Research (IAHR) and of the International Association of Scientific Hydrology (IASH).

Dipak Gyawali is *Pragya* (Academician) of the Nepal Academy of Science and Technology (NAST) since 1992 and chairman of Interdisciplinary Analysts, a research and consulting firm. He chairs the newly founded liberal arts college, the Nepâ School of Social Sciences and Humanities. He also directs research at the non-profit Nepal Water Conservation Foundation. By profession, he is a hydroelectric power engineer (Moskovsky Energetichesky Institute, USSR, 1979) as well as a political economist studying resource use (Energy and Resources Group, University of California, Berkeley, 1986). He has served as Nepal's Minister of Water Resources (responsible for power, irrigation and flood control) between November 2002 and May 2003 and was a UNESCO/UNU-IAS Visiting Professor of Water and Cultural Diversity at the United Nations University in Yokohama, Japan in 2010. He was a member of the panel of experts of the Mekong River Commission and he currently serves on the Steering Committee of the Mekong Program on Water Environment and Resilience (MPower). Previously he has been chair or member of numerous national and international committees and programmes on water research and water management. Dipak Gyawali was a member of the assessment committee UNESCO-IHE in 2007.

Prof. dr. Rivka Kfir has been an Extraordinary Professor and advisor at the Water Institute, University of Pretoria, South Africa since 2011. She obtained her doctorate in medical microbiology in 1981. She also holds a degree in Management, obtained from the Faculty of Economics and Political Science, University of London (1996). From 2001 until 2011 she was Chief Executive Officer of the Water Research Commission (WRC), Pretoria, South Africa. Before that she was Executive Director of Knowledge Management and Strategy, National Research Foundation, (NRF), Pretoria, South Africa (2000-2001) and Technology Manager, Council for Scientific and Industrial Research (CSIR), Pretoria, South Africa (1996-2000). Rivka Kfir's professional activities include being a member of the Academy of Science of South Africa, ASSAf, the Water Institute of Southern Africa. She was a Founding Board member of the Global Water Research Coalition and a Governing Council member of the International Water Association (IWA). She has published numerous papers and articles.

Prof. dr. Grietje Zeeman is professor in New Sanitation at the Sub-department of Environmental Technology (ETE) at Wageningen University and Research Centre (WUR). She obtained her PhD in Agricultural and Environmental Sciences from Wageningen Agricultural University, The Netherlands in 1991. She has acquired funding for various research projects, such as The London School of Hygiene & Tropical Medicine (2011-2013), STW PhD and Post-doc research on Enhanced Enzymatic Anaerobic Fermentation of Organic Residues (EnzyFOR) (2011-2015). Grietje Zeeman has been on the scientific board for international conferences organised by the International Water Association (IWA) and on the organisation board of other international conferences. Her professional activities include chairing the Technical Committee Anaerobic Digestion (TCA) of the Dutch National Association for Water Quality Management (NVA) and her membership of ONS, an advisory body on New Sanitation.

Franca Kramer BSc obtained her bachelor's degree in Life Science and Technology from Delft University of Technology/University Leiden in 2009 and is currently enrolled as a master's student in Water Management, a specialisation programme in Civil Engineering at Delft University of Technology. Part of her master's programme was a research project at the Technical University Bandung, Indonesia. She participated in a study visit to Israel and Palestina on water management and attended the Young Water Professionals Conference in Leuven 2011. She has been a student member of the educational committee Civil Engineering.

Appendix 2: Programme of the site visit

Time	Subject	Panel
Monday 17 September		
08.45	*Welcome day 1*	Prof. Andras Szollosi-Nagy, rector Jan Herman Koster, Education Bureau
09:00 – 10:30	Preparatory meeting of the committee: discussing the NVAO framework for limited assessments and joint degrees	
10:30 - 11:30	Inventory and reading of information on programmes and joint degrees, supplied by UNESCO-IHE	
11:30 - 12:15	Discussing the critical reflections and theses of all four programmes	
12:15 – 13:00	*Lunch*	
13:00 – 14:00	Introductory meeting with the management	Prof. Andras Szollosi-Nagy, rector Prof. Stefan Uhlenbrook, vice-rector Academic Affairs Prof. Maria Kennedy, Chair programme committee MWI Prof. Dano Roelvink, Chair programme committee WSE Prof. Pieter van der Zaag, Chair programme committee WM Greet Vink, Business Director Jan Herman Koster, Education Bureau
14:00 – 14:45	Meeting with students of the master **Water Management** (students of all different tracks)	Claudia Zamora, WQM, Peru Bunthida Plengsaeng, WCM, Thailand Tobias Angula, WRM, Namibia Joseph Nartey, WRM, Ghana Risch Tratschin,WSM, Switzerland Kurniati Widyastuti, WSM, Indonesia
14:45 – 15:30	Meeting with the programme committee (teachers + student member 'educational committee') of the master **Water Management**	Prof. Pieter van der Zaag, Chair Jeltsje Kemerink, Programme Coordinator Schalk-Jan van Andel Prof. Meine Pieter van Dijk Safa Fanaian Student member Peter Kelderman Marloes Mul Maria Rusca Klaas Schwartz Jan Herman Koster, Education Bureau
15:30 – 16:00	*Break*	
16:00 – 16:20	Alumni officer	Maria Laura Sorrentino
16:20 – 17:05	Meeting with students of the master **Water Science and Engineering** (students of all different tracks)	Fátima Mussá, HWR, Mozambique Alex José Kaune Schmidt, LWD, Germany Eunice Rodrigues da Silva, HECEPD, Portugal Hesam Sanaee, HECEPD, Iran Ricardo González Flores, HERBD, Bolivia Alifta Ariestiwi, HI, Indonesia Zhao Yi, HI, China

17:05 – 17:50	Meeting with the programme committee (teachers + student member 'educational committee') of the master **Water Science and Engineering**	Prof. Dano Roelvink, Chair Erik de Ruyter, Programme Coordinator Schalk Jan van Andel Karen Anguizola, Student member Luigia Brandimarte Prof. Charlotte de Fraiture Shreedhar Maskey Prof. Michael McClain Prof. Arthur Mynett Prof. Dimitri Solomatine Suryadi Prof. Stefan Uhlenbrook Mick van der Wegen Jan Herman Koster, Education Bureau
17:50 – 18:30	Rounding up	
18:30 – 19:00	*Travelling time*	
19:00 – 21:00	*Dinner*	

Tuesday 18 September

08.45	*Welcome day 2*	
09:00 – 09:45	Meeting with students of the master **Environmental Science**	Ndayisaba Cyprie, EST, Rwanda Freweyni Tammene, EST, Eritrea Brenda Chimombe, EPM, Zimbabwe Mark Ayertey, WQM, Ghana Perdana Nugroheni, IMETE, Indonesia
09:45 – 10:30	Meeting with the programme committee (teachers + student member 'educational committee') of the master **Environmental Science**	Prof. Piet Lens, Chair Henk Lubberding, Programme Coordinator Hans van Bruggen Bipin Dangol, Student member Edwin Hes Tineke Hooijmans Prof. Ken Irvine Peter Kelderman Jeltsje Kemerink Prof. Jan Leentvaar Jan Herman Koster, Education Bureau
10:30 – 10:45	*Break*	
10:45-11:15	Skype conversation with the management committee including representative from AIT Bangkok about the ES Joint Degree programme **Environmental Technology for Sustainable Development (ETSuD)**	Prof. Piet Lens, UNESCO-IHE Peter van der Steen, UNESCO-IHE Prof. Ajit Annachhatre, AIT Dr. Thammarat, AIT Jan Herman Koster, Education Bureau
11:15 – 11:30	*Break*	
11:30 – 12:00	Skype conversation with the management committee including representatives from the BOKU university in Austria and the Egerton University in Kenya about the ES Joint Degree programme **Limnology and Wetland Management**	Edwin Hes, UNESCO-IHE Prof. Ken Irvine, UNESCO-IHE Dr. Kitaka, Egerton University Prof. Owido, Egerton University Dr. Stefan Schmutz, BOKU University Dr. Gerald Winkler, BOKU University Jan Herman Koster, Education Bureau
12:00-12:15	*Break*	

12:15 – 12:45	Skype conversation with management committee and representatives from the Gent University and the Institute of Chemical Technology Prague about the ES Joint Degree programme **Environmental Technology and Engineering**	Prof. Piet Lens, UNESCO-IHE Peter van der Steen, UNESCO-IHE Jan Bartacek, ICT Prague Prof. Gijs du Laing, Ghent University Prof. Filip Tack, Ghent University Jan Herman Koster, Education Bureau
12:45 – 13:30	*Lunch*	
13:30 – 14:15	Guided tour /Consultation hour (if there are applications for the consultation hour the committee will split on the basis of expertise)	
14:15 – 15:00	Examination Board	Prof. Arthur Mynett, Chair Erick de Jong, Secretary Peter Kelderman Jan Nonner Prof. Dimitri Solomatine Nemanja Trifunovic
15:00 – 15:15	*Break*	
15:15 – 16:00	Real-life and skype meeting with alumni of all programmes from different countries	Aline Okello, Mozambique, PhD student Nirajan Dhakal, Nepal, PhD student Ali Dastgheib, Iran, UNESCO-IHE staff member Raquel dos Santos, Brazil, UNESCO-IHE staff member Benly Ramirez, Mexico, researcher Maria Pascual, Spain, Evides International Lukas Kwezi, Tanzania (through Skype), National Coordinator Global Water Initiative Julius Kipkemboi, Kenya (through Skype), Egerton University
16:00 – 16:20	Student counsellor *NB. For study advice and problems students go to the mentor of the programme committee. With other problems they go to the student counsellor. Because of the international character of UNESCO-IHE there is a short meeting with the student counsellor*	Sylvia van Opdorp-Stijlen
16:20 – 18:00	Looking at Joint Degree information and discussion	
18:00 – 18:30	*Rounding up*	
18:30 – 19:00	*Travelling time*	
19:00 – 21:00	*Dinner*	

Wednesday 19 September

08.45	*Welcome day 3*	
09:00 – 09:45	Meeting with the students of the **master Municipal Water and Infrastructure**(students of all different tracks)	Leonard Msenyele, WSE, Tanzania Mira Yuliawati, WSE, Indonesia Angela Salinas, SE, Bolivia Zeeshan Bilal, SE, Pakistan Mohanad Abunada, UWEM, Palestine Sergio Muñoz Vazquez, UWEM, Mexico

09:45 – 10:30	Meeting with the programme committee (teachers + student member 'educational committee') of the master **master Municipal Water and Infrastructure**	Prof. Maria Kennedy, Chair Tineke Hooijmans, Programme Coordinator Prof. Damir Brdjanovic Jan Herman Koster, Education Bureau Maria Rusca Francesco Rubio, Student member Zoran Vojinovic
10:30 – 10:45	*Break*	
10:45 – 11:15	Skype conversation with the management committee including representative from AIT Bangkok about the MWI Joint Degree programme **Urban Water Engineering and Management** [NB. Local time in Bangkok: 15:45 – 16:45]	Prof. Damir Brdjanovic, UNESCO-IHE Zoran Vojinovic, UNESCO-IHE Prof. Maria Kennedy, UNESCO-IHE Tineke Hooijmans, UNESCO-IHE Prof. Visvanathan, AIT Dr. Babel, AIT Jan Herman Koster, Education Bureau
11:15 – 12:00	Internal committee meeting: preparation for concluding meeting with management	
12:00 – 12:30	*Lunch*	
12:30-13:15	Concluding meeting with management	Prof. Stefan Uhlenbrook, vice-rector Academic Affairs Prof. Maria Kennedy, Chair programme committee MWI Prof. Piet Lens, Chair programme committee ES Prof. Dano Roelvink, Chair programme committee WSE Prof. Pieter van der Zaag, Chair programme committee WM Jan Herman Koster, Education Bureau
13:15 – 14:45	Internal committee meeting preparing draft of preliminary results	
14:45-15:15	Preparing public presentation of the chairman	
15:15-15:30	Public presentation of preliminary results by the chairman	
15:30-16:00	Reception	

Appendix 3: Domain-specific framework of reference

The Water Management domain concerns the utilisation and conservation of water resources and the associated infrastructural, organisational and institutional arrangements. The competence of water managers combines a sound understanding of water availability in terms of quality and quantity and hence of key biophysical and hydrological processes, and the ability to quantify the uses and requirements of water by humans and the environment, with a critical understanding of legal, institutional, economic and other arrangements that regulate access, allocation, treatment, use and discharge of water. Together, the specialisations cover four sub-domains, namely Water Quality Management (jointly offered with the UNESCO-IHE master's degree programme in Environmental Sciences), Water Resources Management, Water Services Management and Water Conflict Management.

These sub-domains can be delineated as follows:

- Water Quality Management studies the water quality impacts of human activities on aquatic ecosystems, as well as alternative remedial actions, under different levels of environmental stress and in different socioeconomic contexts;
- Water Resources Management studies the ways in which water availability and use are matched, and develops alternative land use and water allocation policies and models and legal and institutional arrangements from the local watersheds to the basin scale and beyond;
- Water Services Management studies the provision of water and sanitation services and the management of related infrastructure, and designs new institutional and financial instruments and business models for different socio-economic contexts;
- Water Conflict Management studies the interplay between the main biophysical processes and social dynamics of water resources systems in analysing, anticipating, preventing and managing conflicts and develops skills to design and facilitate inclusive consultation and conflict management processes between actors at different levels.

The Water Management domain is interdisciplinary by nature (Berndtsson et al., 2005; Kirshen et al., 2004; UNESCO-IHP, 1999). Central to its domain is the concept of Integrated Water Resources Management (IWRM) (GWP, 2000; World Bank, 1993) and the aim of developing and managing sustainable water resource systems as defined by the American Society of Civil Engineers (ASCE, 1998). More recent, the political contested nature of water management has gained emphasis in the domain including critical views on the concept of IWRM (Conca, 2006; Molle, 2008). Consequently, the domain of the master's degree programme in Water Management is multidisciplinary and consists of three types of aspects:

1. natural science aspects that enhance the understanding of physical, biological and technical and engineering processes;
2. social science aspects that enhance the understanding of legal, social, political, economic, financial, institutional and managerial processes;
3. integrative aspects that enhance the understanding of the interplay between biophysical and social processes.

The relative young domain of water management is constantly evolving and extending its knowledge base into new disciplines such as (human)geography, spatial planning, economics and political science. Moreover, domain-specific interdisciplinary tools and methodologies are being developed, tested and evaluated. Through involvement of staff and students in research projects and active participation in global and local networks, the master's degree programme

in Water Management remains closely linked to these latest developments. As a result, new concepts and emerging issues are integrated into the programme such as, for example, the use of social media in stakeholder participation, integrated modelling for multiple uses of water resources, the concept of "waterscapes", multiple modes of water governance, the payment for environmental services in view of upstream downstream asymmetries and global changes including climate change.

Appendix 4: Intended learning outcomes

Final qualifications master's degree programme in Water Management:

Knowledge & understanding

1. knowledge of current theory and contemporary developments in Water Management;
2. the ability to describe the rationale for an integrated and interdisciplinary approach for managing water systems;
3. knowledge of biological, physical and chemical principles of water systems;
4. knowledge of economic, institutional and legal principles, approaches and instruments in water management;
5. understanding the broader scientific, engineering and socio-economic context and the role of other disciplines required for Water Management;

Applying knowledge and understanding

6. the ability to apply the knowledge and academic capabilities acquired, in management and engineering contexts;
7. the ability to contribute to managing water systems and organisations and to the development of institutional arrangements;
8. the ability to collect, analyse and organise relevant information and to draw sound conclusions;
9. the ability to prepare and implement a scientific research plan;
10. the ability to contribute to theoretical, methodological or applied developments within the field of study;

Making judgements

11. the ability to decide between different ideas and approaches independently, based on available information, and assesses the potential for application, integration and further development;
12. the ability to select and apply a variety of techniques, tools and procedures in order to evaluate the consequences of different development and intervention scenarios;
13. the ability to reflect critically on how different activities impact on the wise use of water;

Communication

14. the ability to report and communicate results clearly, and to explain and defend the reasoning, knowledge and assumptions to a variety of audiences;
15. the ability to function effectively in a multi-disciplinary team;
16. the capability to assess interests among different stakeholders and to facilitate decision-making processes;

Learning skills

17. the ability to extend and enhance one's own knowledge, insight and skills in a largely autonomous manner;

Learning Outcomes Water Resources Management

Knowledge & theory

1. be able to describe and predict for a given water resources system the main hydrological, hydraulic, chemical and ecological processes and how these processes are dynamically linked with human activities, including land and water use;
2. be able to describe and explain the main concepts and instruments for analysing and influencing formal and informal arrangements over water, including policies, laws and institutions, and by adopting a historical perspective;
3. be able to explain the key concepts for integrated, multi-disciplinary and interdisciplinary analyses of water systems and describe the challenges of such approaches;
4. be able to 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;

Methods, techniques & tools

5. be able to 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;
6. be able to formulate and critically evaluate governance frameworks related to water resources management and apply tools for policy analysis with the emphasis on social inclusion and sustainability;
7. be able to combine different types of method and through a process of triangulation synthesise outcomes in a coherent manner;

Analysis, synthesis & integration

8. be able to define a given water resources system, and compose the water flows across time and space, including the various water uses, and describe the interdependencies these create between the various water users;
9. be able to critically evaluate technical and/or institutional water resources interventions (projects/ programmes/ policies/ agreements) through analysis of implications for the water resources system, its users and their interrelations at various spatial and temporal scales;

Research

10. be able to conduct, independently or in a multidisciplinary team, research including the formulation of research questions and hypotheses, the selection and application of adequate research methodologies and techniques and the formulation of well-founded conclusions, recommendations and limitations;

General academic skills

11. be able to clearly and systematically communicate, argue and defend findings in oral and written presentations to a variety of audiences;
12. think in multidisciplinary and integrated dimensions and be able to distinguish main issues from side issues;
13. have the academic attitude and learning skills to enhance and keep up-to-date the acquired knowledge and application skills in a largely independent manner;

Learning Outcomes Water Quality Management

Knowledge and theory

1. be able to describe and predict for a given water resources system the main hydrological, hydraulic, chemical and biological processes and how these processes are dynamically linked with aquatic ecosystems as well as with human activities such as land and water use and pollution;
2. be able to describe and explain the main concepts and instruments for analysing and influencing formal and informal arrangements for water quality management, including policies, laws and institutions, and by adopting a historical perspective;
3. be able to explain the key concepts for integrated, multi-disciplinary and interdisciplinary analyses of aquatic ecosystems and describe the challenges of such approaches;
4. be able to describe concepts to determine the value of water for various uses and users in (amongst others) economic and ecological terms and explain how these concepts can be used in water resources planning at various spatial and temporal scales;

Methods, techniques and tools

5. be able to interpret, design and optimise water quality assessment and monitoring programmes by applying experimental, statistical and modelling tools;
6. Be able to formulate and critically evaluate governance frameworks related to water quality management and apply tools for policy analysis with the emphasis on social inclusion and sustainability;
7. Be able to combine different types of method and through a process of triangulation synthesise outcomes in a coherent manner;

Analysis, synthesis and integration

8. be able to define a given water resources system, and compose the water and pollution flows across time and space, including the various water uses, and describe the interdependencies these create between the various water users;
9. be able to critically evaluate technical and/or institutional interventions focused on water quality (projects/ programmes/ policies/ agreements) through analysis of implications for the water resources system, its users and their interrelations at various spatial and temporal scales;

Research

10. be able to conduct, independently or in a multidisciplinary team, research including the formulation of research questions and hypotheses, the selection and application of adequate research methodologies and techniques and the formulation of well-founded conclusions, recommendations and limitations;

General academic skills

11. be able to clearly and systematically communicate, argue and defend findings in oral and written presentations to a variety of audiences;
12. think in multidisciplinary and integrated dimensions and be able to distinguish main issues from side issues;
13. have the academic attitude and learning skills to enhance and keep up-to-date the acquired knowledge and application skills in a largely independent manner;

Learning Outcomes Water Services Management

Knowledge and theory

1. be able to describe for a given water resources system the interplay between the main biophysical processes and social dynamics, in analysing service delivery modalities;
2. be able to describe and explain the main concepts and instruments for analysing and influencing formal and informal arrangements concerning water supply and sanitation services, including policies, laws and institutions, and by adopting a historical perspective;
3. be able to explain the key concepts for integrated, multi-disciplinary and interdisciplinary analyses of water services management and describe challenges of providing water supply and sanitation services at different levels (from global to local);
4. be able to summarise the current debates relevant for water supply and sanitation services, using institutional and management theories from different academic disciplines (e.g. economics, public administration, sociology, political science, law);

Methods, techniques and tools

5. design and apply analytical tools to research issues of water services management and describe, modify and apply management tools (e.g. with the benchmarking, cost benefit analysis, management information systems) with the aim of improving water supply and sanitation provision;
6. be able to formulate and critically evaluate governance frameworks related to water services management and apply tools for policy analysis with the emphasis on social inclusion and sustainability;
7. be able to combine different types of method and through a process of triangulation synthesise outcomes in a coherent manner;

Analysis, synthesis and integration

8. be able to analyse and evaluate governance processes and utility management arrangements in the water services sector, integrating technical, legal administrative, social and financial components;
9. be able to critically evaluate technical and/or institutional interventions (projects/ programmes/ policies/ agreements) through analysis of implications for water supply and sanitation services, its users and their interrelations at various spatial and temporal scales;

Research

10. be able to conduct, independently or in a multidisciplinary team, research including the formulation of research questions and hypotheses, the selection and application of adequate research methodologies and techniques and the formulation of well-founded conclusions, recommendations and limitations;

General academic skills

11. be able to clearly and systematically communicate, argue and defend findings in oral and written presentations to a variety of audiences;
12. think in multidisciplinary and integrated dimensions and be able to distinguish main issues from side issues;
13. have the academic attitude and learning skills to enhance and keep up-to-date the acquired knowledge and application skills in a largely independent manner;

Learning Outcomes Water Conflict Management

Knowledge & theory

1. be able to describe for a given water resources system the interplay between the main biophysical processes and social dynamics, in analysing, anticipating, preventing and managing conflicts;
2. be able to describe and explain the main concepts and instruments for analysing and influencing formal and informal arrangements over water for collaboration, including policies, laws and institutions, and by adopting a historical perspective;
3. be able to explain the key concepts for integrated, multi-disciplinary and interdisciplinary analyses of water systems and describe the challenges of such approaches at sector, intersectoral and transboundary levels;
4. be able to name and critically discuss theories, concepts and tools of conflict management and cooperation building techniques in the context of natural resources and water in particular;

Methods, techniques & tools

5. be able to design and facilitate inclusive consultation and conflict management processes, such as consensus building, public participation, negotiation and mediation between actors at different levels;
6. be able to formulate and critically evaluate governance frameworks related to water conflict management and apply tools for policy analysis with the emphasis on social inclusion and sustainability;
7. be able to do combine different types of method and through a process of triangulation synthesise outcomes in a coherent manner;

Analysis, synthesis & integration

8. be able to define a given water resources system, assess the different functions of the water resources system and the often competing interests of water using sectors and actors, describe the interdependencies between these, and finally assess the possibilities and limitations of cooperation;
9. be able to critically evaluate technical and/or institutional interventions focused on conflict management (projects/ programmes/ policies/ agreements) through analysis of implications for the water resources system, its users and their interrelations at various spatial and temporal scales;

Research

10. be able to conduct, independently or in a multidisciplinary team, research including the formulation of research questions and hypotheses, the selection and application of adequate research methodologies and techniques and the formulation of well-founded conclusions, recommendations and limitations;

General academic skills

11. be able to clearly and systematically communicate, argue and defend findings in oral and written presentations to a variety of audiences;
12. think in multidisciplinary and integrated dimensions and be able to distinguish main issues from side issues;
13. have the academic attitude and learning skills to enhance and keep up-to-date the acquired knowledge and application skills in a largely independent manner.

Appendix 5: Overview of the curriculum of the programme

Overview curriculum of the master's degree programme in Water Management

YEAR 1	Foundation	5 ECTS	1	**Principles of Integrated Water Resources Management** Lectures / Workshop / Computer exercise/ Case study Written examination / Assignment			
		5 ECTS	2	**The Water Resources System** Lectures / Workshops / Lab Work / Computer exercise Written examination / Assignment			
		5 ECTS	3	**Water Governance** Lectures / Workshops / Tutorial / Debates / Films/ Exercise Written examination / Group assignment			
		5 ECTS	4	**Water Economics** Lectures / Workshops / Role Play / Field trip / Exercises Written examination / Assignment			
				Water Quality Management	**Water Resources Management**	**Water Conflict Management**	**Water Services Management**
	Specialisation	5 ECTS	5	**Water Quality Assessment** Lectures / Lab work / Exercise Written examination / Assignment	**Negotiation & Mediation I** Lectures / Workshops/ Role plays Written examination / Assignment	**Negotiation & Mediation I** Lectures / Workshops/ Role plays Written examination / Assignment	**Water Supply & Sanitation Systems** Lectures / Workshops / Field trip Written examination / Assignment
		5 ECTS	6	**Wetlands for Water Quality** or **Environmental Engineering**	**Water Systems Modelling** Lectures / Workshops / Field trip Written examination / Assignment	**Negotiation & Mediation II** Lectures / Workshops/ Role plays Written examination / Assignment	**Institutional Analysis** Lectures / Debates / Exercise Written examination / Assignment
		5 ECTS	7	**Environmental Planning** Lectures / Exercise / Field trip Written examination / Assignment	**Water Resources Planning** Lectures / Workshops / Exercise Written examination / Assignment	**Water Resources Planning** Lectures / Workshops / Self-study Written examination / Assignment	**Financial Management** Lectures / Workshops / Field trip / Game Written examination / Assignment
		5 ECTS	8	**Water & Environmental Law** Lectures / Workshops / Case study / Role Play Written examination			
	integr	3 ECTS	9	**International Fieldtrip** Excursions / Field work Report			
				Institute wide elective modules, including (modules most relevant for the water management programme):			
	Specialisation	5 ECTS	10	**Aquatic Ecosystems** Lectures / Field work/ Lab work / Exercise; Assignment with oral examination **Managing Water Organisations** Lectures / Case Study / Workshops / Field trip; Assignment **Advance Water System Modelling** Lectures / Workshops / Case study / Exercise; Written examination / Assignment with oral examination			
		5 ECTS	11	**Watershed & River Basin Management** Lectures / Exercise/ Case study; Written examination / Assignment with oral examination **Public-Private Partnerships** Lectures / Case Study / Field trip / Exercise; Written examination / Assignment			
	Integra	7 ECTS	12	**IWRM Group Work** Workshops/ Study in small groups Group assignment with oral examination			
	Research	3 ECTS	13	**Capita Selecta & Research Methodology** Lectures / Workshops / Exercises			
		7 ECTS	14	**MSc Research Proposal Development** Self-study Report / Defence presentation			
YE		36 ECTS	15	**MSc Research** Self-study Report / Defence presentation			

Appendix 6: Quantitative data regarding the programme

Data on intake, transfers and graduates

Student performance and student completion rates for the academic years 2006-2008 to 2010-2012

Academic year	# students enrolled	# students absconded	# certificates of postgraduate studies awarded	# Master's degrees awarded	# students on-going	% student completion ratio
2010-2012	34	0	0	29	5	85
2009-2011	28	1	3	23	1	82
2008-2010	24	3	0	21	0	88
2007-2009	26	0	1	25	0	96
2006-2008	28	1	0	27	0	96
Total	140	5	4	125	6	89

Teacher-student ratio achieved

Staff input and teacher-student ratio achieved in master's degree programme Water Management

Academic year	Programme part	Hours	FTE input	Student/FTE
2010-2012	Taught part UNESCO-IHE staff	6262	3.7	10.5
2010-2012	Taught part guest lecturers	660	0.4	97.5
2010-2012	Master's supervision	2419	1.4	23.6
Total		9342	5.5	

Average amount of face-to-face instruction per stage of the study programme

Average contact hours within the master's degree programme Water Management

Study phase	Contact hours
Taught part	620 hours
Master's thesis research	50 hours

Appendix 7: Documents studied by the committee during the visit

In addition to the information provided in the critical reflection and its annexes the committee investigated the following documents that were made available during the site visit:

- Overview of the curriculum, in relation to other master's programmes at UNESCO-IHE;
- Outline description of two modules [stating learning outcomes, teaching method(s), attainment targets, assessment methods, literature (mandatory/recommended), teacher and credits];
- Minutes of the Programme Committee 2011 and 2012;
- Examination Board meeting minutes 2011 and 2012;
- Staff satisfaction survey 2012;
- Teaching and examination regulations;
- Programme Handbook 2011-2013;
- Preparation Guide and Practical Guide for students;
- Sample of Diploma and Diploma Supplement;
- Alumni Tracer Survey 2011.

The committee studied eight theses, which were selected at random by the project leader and the chair of the committee.

Water Conflict Management (WCM)	28806
	24409
Water Quality Management (WQM)	27111
Water Resources Management (WRM)	29478
	32288
	29787
Water Services Management (WSM)	30104
	33827

Appendix 8: Declarations of independence

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nederlands - vlaamse accreditatieorganisatie

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

A. VAN DER BEKEN
F. Laurentplein 45
9000 GENT

NAME:

HOME ADDRESS:

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / SECRETARY:

UNESCO - IHE

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

nvao
nederlands - vlaamse accreditatieorganisatie

HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: GENT DATE: 26 APRIL 2012

SIGNATURE:

A. VAN DER BEKEN
F. Laurentplein 45
9000 GENT

nvao
nederlands - vlaamse accreditatieorganisatie

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: Rivka Kfir

HOME ADDRESS: 97 Versenia str.
Lynnwood Ridge, Pretoria 0081
South Africa

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / SECRETARY:

Four Master degree programmes at UNESCO-IHE Institute for Water Education

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU - Quality Assurance Netherlands Universities

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

1

nvao
nederlands - vlaamse accreditatieorganisatie

HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: Pretoria, South Africa DATE: 26-04-2012

SIGNATURE:

2

nvao

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: Prof. Dr. Janos BOGARDI

HOME ADDRESS: Berg Str. 14 53474 Bad Neuenahr-Ahrweiler, Germany

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / SECRETARY

Degree Programmes of UNESCO-IHE Institute for Water Education, Delft, the Netherlands

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

1

nvao

HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: Bad Neuenahr DATE: 26. April 2012

SIGNATURE: Janos Bogardi

2

Q 387

nvao

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME: DIPAK GYAWALI

HOME ADDRESS: 1 KOTHULACHHI, PATAN DHOKA, LALITPUR-21, GPO Box 3971, KATHMANDU NEPAL

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / SECRETARY:

UNESCO-IHE INSTITUTE FOR WATER EDUCATION

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

QANU

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

1

nvao

HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: KATHMANDU DATE: 14 Sept. 2012

SIGNATURE: Dipak Gyawali

2

nvao

DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY
TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME
THE UNDERSIGNED

NAME: Grietje Zeeman

HOME ADDRESS: Geertjesweg 108, 6706EE Wageningen, The Netherlands

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT /

The four MSc programmes of UNESCO-IHE

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:
QANU

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

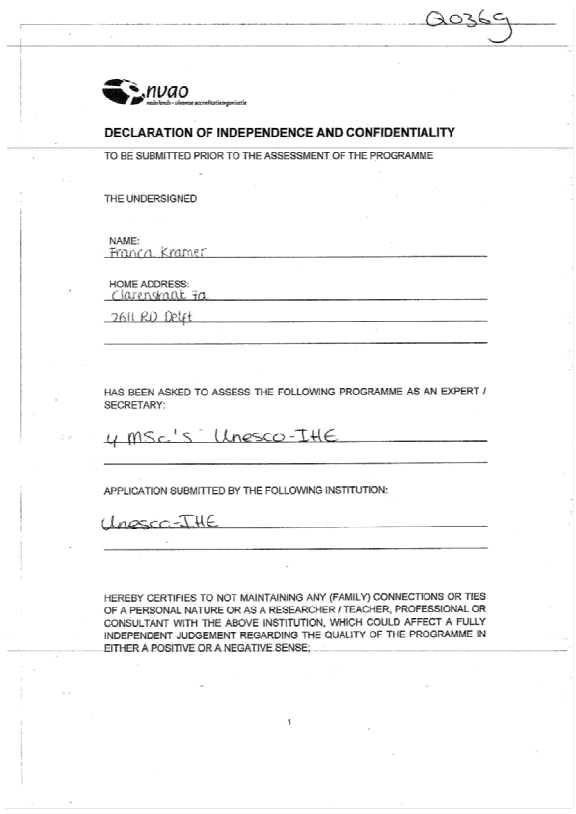
HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: Wageningen DATE: 13-11-2012

SIGNATURE:



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DECLARATION OF INDEPENDENCE AND CONFIDENTIALITY

TO BE SUBMITTED PRIOR TO THE ASSESSMENT OF THE PROGRAMME

THE UNDERSIGNED

NAME:
Franca Kramer

HOME ADDRESS:
Clarenkamp 39
2611 RD Delft

HAS BEEN ASKED TO ASSESS THE FOLLOWING PROGRAMME AS AN EXPERT / SECRETARY:

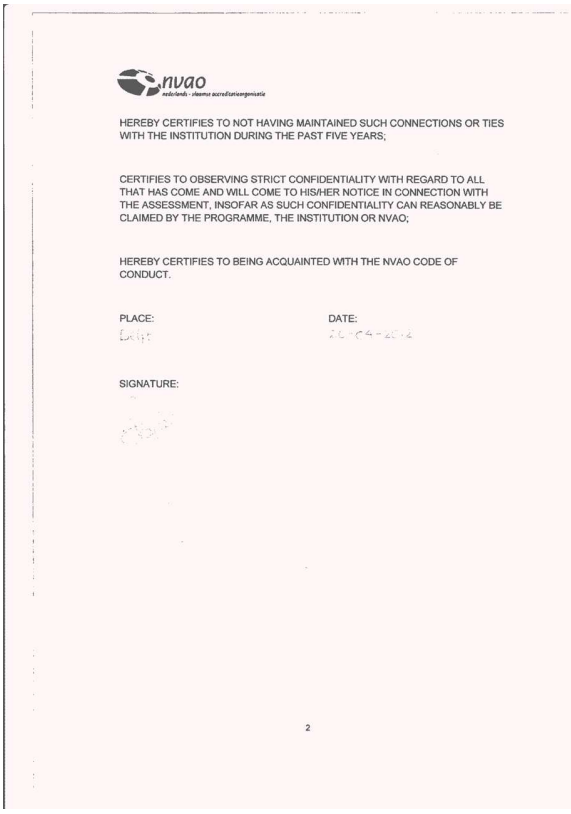
4 MSc.'s Unesco-IHE

APPLICATION SUBMITTED BY THE FOLLOWING INSTITUTION:

Unesco-IHE

HEREBY CERTIFIES TO NOT MAINTAINING ANY (FAMILY) CONNECTIONS OR TIES OF A PERSONAL NATURE OR AS A RESEARCHER / TEACHER, PROFESSIONAL OR CONSULTANT WITH THE ABOVE INSTITUTION, WHICH COULD AFFECT A FULLY INDEPENDENT JUDGEMENT REGARDING THE QUALITY OF THE PROGRAMME IN EITHER A POSITIVE OR A NEGATIVE SENSE;

1



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HEREBY CERTIFIES TO NOT HAVING MAINTAINED SUCH CONNECTIONS OR TIES WITH THE INSTITUTION DURING THE PAST FIVE YEARS;

CERTIFIES TO OBSERVING STRICT CONFIDENTIALITY WITH REGARD TO ALL THAT HAS COME AND WILL COME TO HIS/HER NOTICE IN CONNECTION WITH THE ASSESSMENT, INSOFAR AS SUCH CONFIDENTIALITY CAN REASONABLY BE CLAIMED BY THE PROGRAMME, THE INSTITUTION OR NVAO;

HEREBY CERTIFIES TO BEING ACQUAINTED WITH THE NVAO CODE OF CONDUCT.

PLACE: Delft DATE: 26-04-2012

SIGNATURE:

2

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ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: Marianne van der Weiden

PRIVÉ ADRES: Homeruslaan 62
3581 HJ Utrecht

IS ALS DESKUNDIGE / SECRETARIS GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

UNESCO-IHE

AANGEVRAAGD DOOR DE INSTELLING:

QANU

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

1

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VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Utrecht DATUM: 14-9-2012

HANDTEKENING:

2

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ONAFHANKELIJKHEIDS- EN GEHEIMHOUDINGSVERKLARING

INDIENEN VOORAFGAAND AAN DE OPLEIDINGSBEOORDELING

ONDERGETEKENDE

NAAM: Adrienne Wieldraaijer-Huijzer

PRIVÉ ADRES: Jupiter 116
4188 EJ Amstelveen

projectleider

IS ALS ~~DESKUNDIGE / SECRETARIS~~ GEVRAAGD VOOR HET BEOORDELEN VAN DE OPLEIDING:

4 masteropleidingen Unesco-IHE

AANGEVRAAGD DOOR DE INSTELLING:

Unesco-IHE

VERKLAART HIERBIJ GEEN (FAMILIE)RELATIES OF BANDEN MET BOVENGENOEMDE INSTELLING TE ONDERHOUDEN, ALS PRIVÉPERSOON, ONDERZOEKER / DOCENT, BEROEPSBEOEFENAAR OF ALS ADVISEUR, DIE EEN VOLSTREKT ONAFHANKELIJKE OORDEELSVORMING OVER DE KWALITEIT VAN DE OPLEIDING TEN POSITIEVE OF TEN NEGATIEVE ZOUDEN KUNNEN BEÏNVLOEDEN;

1

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VERKLAART HIERBIJ ZODANIGE RELATIES OF BANDEN MET DE INSTELLING DE AFGELOPEN VIJF JAAR NIET GEHAD TE HEBBEN;

VERKLAART STRIKTE GEHEIMHOUDING TE BETRACHTEN VAN AL HETGEEN IN VERBAND MET DE BEOORDELING AAN HEM/HAAR BEKEND IS GEWORDEN EN WORDT, VOOR ZOVER DE OPLEIDING, DE INSTELLING OF DE NVAO HIER REDELIJKERWIJS AANSPRAAK OP KUNNEN MAKEN.

VERKLAART HIERBIJ OP DE HOOGTE TE ZIJN VAN DE NVAO GEDRAGSCODE.

PLAATS: Amstelveen DATUM: 2-9-2012

HANDTEKENING:

2

Appendix 9: List of abbreviations

AIT	Asian Institute of Technology, Bangkok
BOKU	Universität für Bodenkultur, Austria
EC	European Credit
EPM	Environmental Planning & Management
ES	Environmental Science
EST	Environmental Science and Technology
ETSuD	Environmental Technologies for Sustainable Development
FRM	Flood Risk Management
fte	full-time equivalent
HECEPD	Hydraulic Engineering Coastal Engineering and Port Development
HELWD	Hydraulic Engineering Land and Water Development
HERBD	Hydraulic Engineering River Basin Development
HI	Hydroinformatics
HWR	Hydrology and Water Resources
ICT Prague	Institute of Chemical Technology Prague
IMETE	International Masters in Environmental Technology and Engineering
IWRM	Integrated Water Resources Management
KNUST	Kwame Nkrumah University of Science and Technology, Ghana
LWE	Limnology and Wetland Ecosystems
LWM	Limnology and Wetland Management
MSc	Master of Science
MWI	Municipal Water and Infrastructure
NVAO	Nederlands-Vlaamse Accreditatie Organisatie (Accreditation Organisation of the Netherlands and Flanders)
QANU	Quality Assurance Netherlands Universities
SE	Sanitary Engineering
UniValle	Universidad del Valle, Colombia
UWEM	Urban Water Engineering and Management
WCM	Water Conflict Management
WM	Water Management
WQM	Water Quality Management
WRM	Water Resources Management
WSE	Water Science and Engineering
WSE	Water Supply Engineering