

THE CONCEPT AND APPLICATION OF THE UNESCO WEB-BASED URBAN WATER EDUCATION, TRAINING AND TECHNOLOGY TRANSFER TOOL (UWETTT)

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ABSTRACT

The paper presents the concept and contents of the UWETTT (Urban Water Education Training and Technology Transfer) web based educational tool, developed by the authors within the project 9 of the Focal Area 3.5 of the UNESCO IHP VI programme. The topics covered include data management urban water interaction, urban ground water management, urban water management in specific climates, health and safety, urban aquatic habitats, and socio-economic issues in urban water conflict resolutions. The tool will use the books which are the main deliverables of the 8 projects of the above program. In addition to the books, selected part of which will be used for PP illustrations, exam and quiz exercise and as basis for essays. It is designed to provide support to urban water education and training at both formal and continuing programs, but most likely in combination of the two. The tool uses public domain software MOODLE as a basic platform and Course Genie for conversion of the conventional text files into web searchable environment. The UWETTT concept is made so that it enables further upgrades, expansion to the relevant disciplines, involvement of the other course material developers, translation to other languages, and customisations to meet the needs of the local scientific, professional and users' communities on global scale

Key words: Urban Water, Web-based education, training platform

1. INTRODUCTION TO THE UWETTT

UNESCO IHPVI Web-based Urban Water Education, Training and Technology Transfer Tool (UWETTT) is a consolidated web-based training package that will enhance Urban Water Education. It is based on the development and results of the educational components - activities for integrated urban water management of the eight IHP-VI FA 3.5 projects to be completed by September 2007 within the framework of the ninth project. The projects, which are a logical continuation of the concept of integrated urban water management presented in the book "Frontiers in Urban Water Management – Deadlock or hope" Maksimovic and Tejada-Guibert (2001) are:

1. Data requirements management for integrated urban water management
2. Processes and interactions in the urban water cycle
3. Towards sustainable urban groundwater management
4. Integrated urban water system interactions: complementarity among urban water services
5. Integrated urban water modelling and management under specific climates
6. Urban water security, human health and disaster prevention
7. Urban aquatic habitats in integrated urban water management
8. Socio-economic and institutional aspects in urban water management
9. Urban water education, training and technology transfer

Each of the first 8 projects is supposed to produce a reference (state-of-the-art) book or some other publication based on which educational material will be generated as integrated within the project 9 under the general UWETTT framework.

The main objectives of this Tool are to strengthen the means of providing urban water training, achieve paradigm shift in sustainable urban water management schemes through innovative, interdisciplinary, problem solving oriented, environmental friendly approaches, and provide support to advanced education, training, and technology transfer in Urban Water Management (UWM) to both formal and continuing education or (most likely) by combination of the two such as presented by Naken (2007) in this Symposium. To achieve this goal the following material will be made available:

- updated information about existing programs compliant with the above goals
 - innovative training tools and implementation of methodology
 - selected educational material produced within the above UNESCO IHP projects
 - selected sets of quality assured data
 - Additional material from the alternative sources.
- under different social, developmental, climatic, regional, cultural, etc. settings.

Although most of the material that will be found in the UWETTT originates from the 9 UNESCO IHPVI, some additional material has been used – made available (for example contribution (access to the course) of the Technical University of Tampere (Finland).

2. THE MISSION OF THE UWETTT ADDRESSING THE PARADIGM SHIFT IN URBAN WATER MANAGEMENT

Many reasons have created the need for the development of such a web-based educational tool under the umbrella of UNESCO's. The most important are the necessity to contribute to spread of the new paradigm in urban water management. Additionally it will strengthen the international "capacity building" by supporting young professionals and experts which will be capable of addressing the shortcomings of the existing urban water management schemes, by introducing in practice the changes introduced by the paradigm shift in urban water management which differ from the conventional wisdom. The main changes introduced are strong environmental content, demand management, water quality improvement, resources recycling, energy efficiency, poverty alleviation through water and sanitation for those without connection and dealing with multiple interactions including socio-economic ones. Additionally the new topics such as specific problems of urban water management in particular climates, health and safety, urban aquatic habitats covered by UNESCO IHPVI. Thus new training tools for integrated approach, based on the above changes are needed and are introduced. Moreover, innovation required in all three major forms of "capacity building": formal (undergraduate), postgraduate and "continuing" education are addressed by making it possible to access the training tool through internet. Changes tackle conventional educational programs in sanitary (public health) and environmental engineering, urban water planning and related subjects by placing emphasis on interaction of urban water subsystems and their interactions with the environment.

3. THE TOOL DEVELOPERS, TARGET USERS AND FURTHER UPGRADE POSSIBILITIES

The current version of the tool has been put together by the UNESCO appointed team coordinated by CUW-UK and other partners in the IRTCUD/CUW network (Humid Tropic (HT) Centre in Porto Alegre, Brazil, Cold Climate (CC) in Trondheim, Norway, Temperate Climate (TC) in Belgrade, Arid and Semi Arid (ASA) unit in Cairo, Egypt and RCUWM in Tehran, Iran). Use has been made of the initial versions of the educational material based on the deliverables of the 8 UNESCO IHPVI projects in urban water management, presented in this Symposium. There are numerous individual experts and institutions that participated in production of the books, workshop proceedings, other reports and training material which serve as a basis for UWETTT. It is impossible to name them all in this article, however they will be listed in the relevant publication and in the final version of the UWETTT. Special appreciation is due to the book editors which in some case took the main burden in final setting of the books' material. The UWETTT material will be used by UNESCO IHE Institute for Water Education as a basis for joint development of the Urban Water Educational

Platform (UWEP) that will out the material in the broader framework for running the formal postgraduate education. The UWTTT concept is made so that it enables further upgrades, expansion to the relevant disciplines, involvement of the other course material developers, translation to other languages, and customisations to meet the needs of the local scientific, professional and users' communities on global scale. It is expected that, in addition to universities and continuing education institutions, the principal users of the tool, will be the following major groups of institutions (network of co-operating partners).

- a. UNESCO Institute for Water Education (IHE Delft) and the group of UNESCO endorsed centres and networks dealing with urban water problems. (IRTCUD / CUW, RCUWM), with regional (HT, CC, ASA, TC) centres.
- b. educational institutions cooperating with scientific associations such as IAHS, IAHR, and IAH, professional associations such as IWA, CIWEM and alike
- c. Other organisations involved in capacity building and awareness raising such as international organisations/programs, cooperating universities, NGOs and alike and
- d. Formal education institutions such as universities, high schools etc.

Important partners (and their possible contributions) for the implementation of UNESCO IHP Web-based Urban Water Training Tool are likely to be:

- LODZ, Jakarta, La-Plata networks, central and eastern Africa ecohydrology networks, TWAS (third World Academy of Science).
- ECOSAN network
- ELAC network (cooperation of EU and Mexico, Nicaragua and Costa-Rica coordinated by DTU, Lingby, Denmark)
- Vo@net (Southeast Asia)
- POWER and CAPNET coordinated by IHE,Delft
- UNESCO IHP secretariat which manages the project in cooperation with the project partners (to be continued after IHPVI comes to its end)
- UNESCO-IHE, because of its mandate in water education will be the major partner and provides inputs in both development of tools and running the program based on its ongoing and forthcoming projects (continuous)
- UNESCO field offices and regional hydrologists which are expected to provide support to regional activities for example creation of regional networks, selection of trainers, regional fund raising, quality control, organization of training courses and capacity building including logistic support (event based)
- UNU organizes short-course on urban flooding jointly with regional or national institutions (3 weeks yearly) as an initial contribution to the training program, open for further upgrade.
- DTU (Lingby, Denmark) will organize a web-based short course on integrated urban water management and will assist in developing business plan for this Tool implementation
- TTU (Tampere, Finland) will make available training courses on risk assessment in urban water systems (scholarship for up to 30 participants) and will cooperate in development of the Tool
- Other institutes and universities.
- Centre for Urban Water (CUW) could contribute to development of UNESCO IHP Web-based Urban Water Training Tool, making available training material and publications, cooperate with UNU in urban flooding course, cooperate with IHE in Tool's development, and assist IHP secretariat in overall management of the IHP VI
- International organizations (UNEP-IETC, UNEP-GPA) and associations, further negotiations on possible involvement
- Other UNESCO and non-UNESCO related centers.

Moreover, it is emphasised that UNESCO IHP Web-based Urban Water Training Tool will serve different target groups and this should be taken into account in the process of further development and upgrade. These target groups are students (undergraduates, MSc, PhD), decision makers, planners,

managers, specialists, urban water and environmental professionals, trainers. Additionally, the development of the Tool must be based on the specific needs and objectives of the 9 UNESCO's sub-projects.

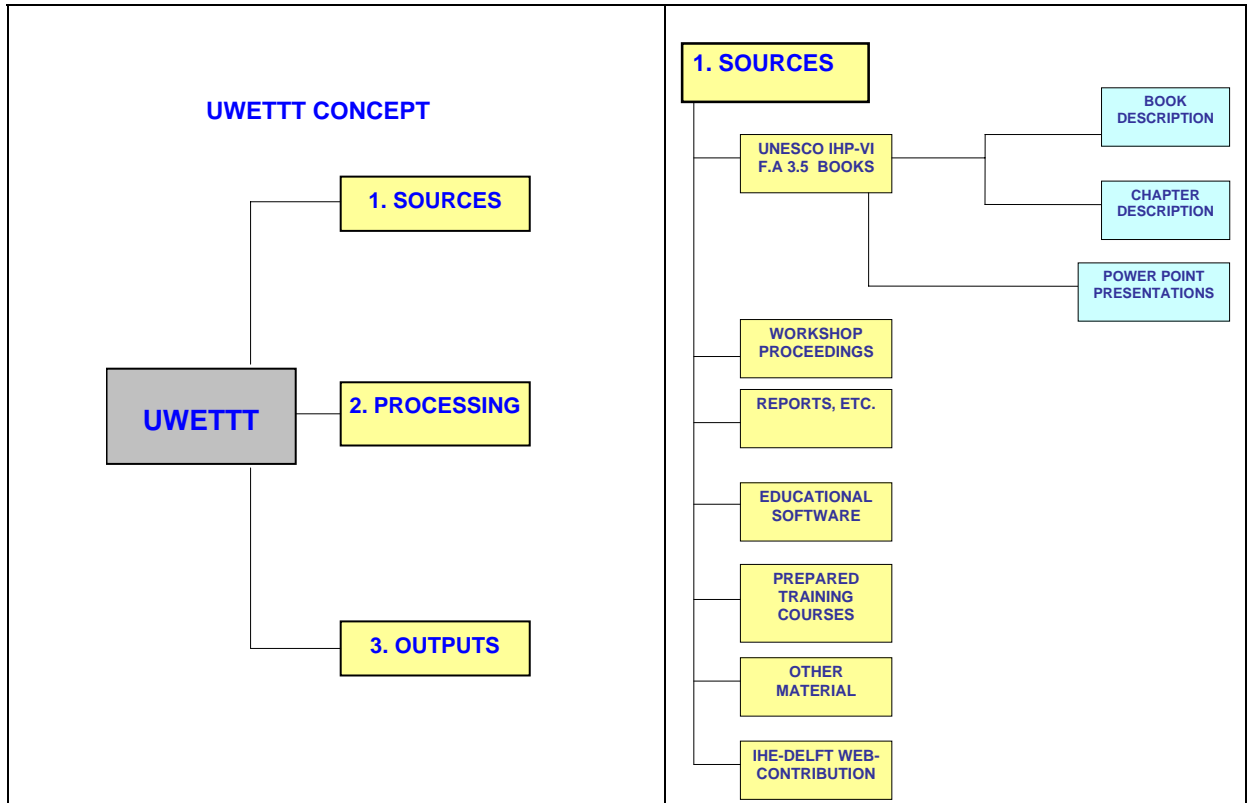


Fig. 1 The UWETT Concept

Fig. 2 Sources of Material for the UWETT

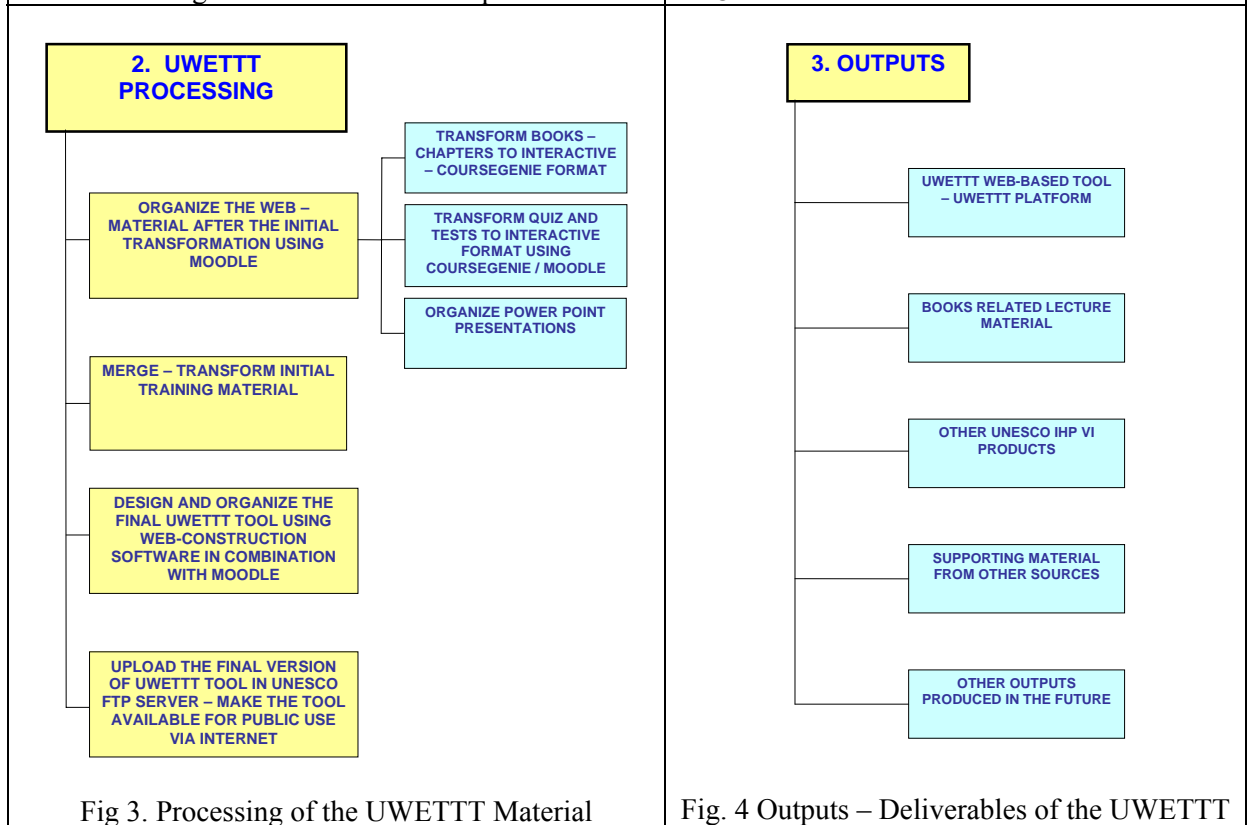


Fig 3. Processing of the UWETT Material

Fig. 4 Outputs – Deliverables of the UWETT

4. METHODOLOGICAL FRAMEWORK

As for the Methodological Framework is created so that the UWETTT (such as presented in Figures 1-4) will fill the gap in conventional education by:

- Providing the basics on paradigm shift in urban water management and how to achieve it
- Providing guiding principles for upgrading, restructuring, and improving existing teaching programs related to urban water management
- Providing information on the sources of innovative materials
- Making available building blocks (training tools) for improving existing programs or development of new ones
- Supporting training networks by making available lecturers and other teaching staff and in customising training tools to suit the local conditions
- Providing information on quality assurance, standard setting, etc.
- Assisting in dissemination of knowledge and technology

Moreover, the methodological framework will adapt its contents to suit the local conditions and needs.

5. APPLICATION OF THE UWETTT

5.1. The structure of the Tool

The most important question is how each of the 8 sub-projects can be developed in a web-based format, according to its objectives and its progress up to now. Taking into account the objectives and the expected results of all the 8 sub-components, their web-based structure as presented in Figures 1-4 will include and provide information on the following topics:

- Principles – Basics – Theoretical Background
- Methodologies for Urban Water Management
- Research that has been made in the specific field of urban water management. Urban water information systems, manuals, guidelines, and case studies in both conventional (Power Point Presentations, Word documents, PDF files, pictures etc) and internet based form can be included. The main idea is that the web-based Tool will support different file formats and will organise them in a web-based environment taking into account the following criteria: high quality of information and relatively fast internet access in order to serve many target groups.
- Training Modules (Regular Courses) run by Universities and Institutes all over the world (UNESCO activities will be placed in first order) as also teaching material. These courses could be in both conventional (text) and web-based format. All the available courses will be listed and directly accessed through the internet. Moreover a list and an open invitation for participation to training courses that will take place in the future will be made available to all interested people. In each case, the training courses will be categorized according to their subject and a direct link for information relevant to the program (when the program takes place, which is the institution that offers the course, admission requirements etc) will be given.
- Information on sources of innovative material (such as new software, programs, tools, training products etc) in urban water sector.
- Information on seminars, services, workshops, symposiums etc that will take place in the future and cannot be attended through the internet. The participation to seminars etc. could be provided through the relevant web-page and links of the Urban Water Tool.
- Metadata: Institutions, Universities and other Organisations that are doing similar educational work in urban water web-based activities and are not, necessarily, contributing to the construction of UNESCO Tool.
- About: The role of UNESCO-IHP as the driving institute for the construction and implementation of the UNESCO IHP Web-based Urban Water Training Tool, the important

partners for the implementation of the Tool, which are the objectives of the specific sub-project, information on the research that has been made up to now in the frame of IHP VI FA 3.5 project, what kind of information is provided through the web-site and to which target-groups is referred to.

- Search Machine: It will provide to all users the option to search (using key words) for information i) Locally, in the web-site of the particular educational sub-project, ii) through the whole Educational Tool, iii) through the whole Internet.
- Degrees: Universities which offer recognised degrees (MSc's etc) through distance-learning Courses. In that case the admission requirements and the award of credit points should be specified.

Moreover, it must be clarified that the above general form of web-based development of the Educational Tool will be adapted to the special needs and objectives of each sub-project. For example, project number 1 "Data requirements management for integrated urban water management", could be developed under the following structure:

- Theoretical Background-Principles
- Methodology for data gathering, processing, and quantification of uncertainty and application under specific climate conditions
- Research: Manual of urban water data management, selected samples of data under specific climate conditions
- Lectures, Tutorials etc. in interactive web-based format that will provide an on-line access to specific fields of data acquisition and processing for urban water management
- Information on sources of innovative material: Development of urban water information system, data sets for special utilization.
- Training: Courses
- Information on data availability – Metadata - Interactions between data providers and data users. Construction of a renewable information system. Institutions and Organizations providing reliable data sets or developing urban water information systems. Information on seminars, workshops etc.
- About: The role of UNESCO-IHP as the driving institution for the construction and implementation of sub-project Number 1, the important partners for the implementation of the project, which are the objectives, information on the research that has been made up to now, what kind of information is further provided through the web-site, to which target-groups is referred to, compatibility of data sets with different software or training Tools, issues about the access to urban water information system etc.
- Search Machine

Another important issue is the fact that all the sub-components will be directly connected with links. Access to all sub-projects of the Educational Tool will be provided through an "index", central web page, explaining the objectives, mission and importance of the Educational Tool.

Additionally, this training system will be planned to work and be accessed by Internet, using even "lower" Internet connections. This is a very important factor about the transfer of this technology, as not all the people and especially students, have the privilege to use "fast internet connections". An option for higher connections could also exist (visualization, interactive form, higher demands). What will be innovative about this system is the simultaneous use of a common web design software - platform with various multimedia applications in order to support different file formats in both passive (or semi-active) and active form. In the final phase of development a system as MOODLE is used in order to join all the components under the same Web-environment. Additionally, the whole Educational Tool will be completely renewable in order to "embody" new information, technologies and improvements.

Another important question is how other people (trainers, model constructors etc.) can prepare their own educational material in order to be easily connected or even used by the Educational Tool. The

answer is that UNESCO IHP Web-based Urban Water Training Tool has been properly constructed in order to support both conventionally and more interactively developed forms of educational materials. In the case of web-based activities direct links will provide access to the training materials. In the case of more "passive" educational formats (texts, PP Presentation, pictures, data-bases, simulation results etc) the direct access to the educational material will be supported using special programming code and scripts that allow the construction of simple links, able to support all file formats.

5.2. The software and methodology that will be used for the development of the web-based application

The main idea about the development of UNESCO IHP Web-Based Urban Water Training Tool is that it must operate under a common "umbrella". For that reason it is important to accept and work under a central development system, a platform, that is able to support and present all kind of urban water information and different file formats under a relatively unique and friendly environment.

A platform that is appropriate to fulfill the above requirements and has additionally the huge advantage to be a free source is Moodle (http://docs.moodle.org/en/About_Moodle). Moodle is a course management system, a free, open source software package designed using sound pedagogical principles, to help educators create effective online learning communities.

The word Moodle was originally an acronym for Modular Object-Oriented Dynamic Learning Environment, which is mostly useful to programmers and education theorists. It's also a verb that describes the process of lazily meandering through something, doing things as it occurs to you to do them, an enjoyable tinkering that often leads to insight and creativity. As such it applies to the way a student or teacher might approach studying or teaching an online course.

In more details, Moodle is a software package for producing internet-based courses and web sites. It's an ongoing development project designed to support a social constructionist framework of education. Moodle is provided freely as Open Source software (<http://www.gnu.org/copyleft/gpl.html>) under the GNU Public License. Basically this means Moodle is copyrighted, but any user is allowed to copy, use and modify Moodle provided that he or she agrees to: provide the source to others; not modify or remove the original license and copyrights, and apply this same license to any derivative work. Moodle can be installed on any computer that can run PHP (the scripting language in which Moodle is written), and can support an SQL type database (for example MySQL). It can be run on Windows and Mac operating systems and many flavors of linux (for example Red Hat or Debian GNU).

It should also be mentioned that a part of the initial approach to develop the pilot version of UNESCO IHP Web-Based Urban Water Training Tool was based on other web-construction software such as Macromedia Dreamweaver. Dreamweaver is a commercial web development tool originally created by Macromedia (now Adobe Systems). Initial versions of the application served as simple HTML editors but more recent versions have incorporated notable support for many other web technologies such as CSS, JavaScript, and various server-side scripting frameworks. The software is available for both the Mac and Windows platforms. As the pilot version of the Web-Based Educational Tool was developed using Dreamweaver the best solution for the final phase of the Tool's development is to use Moodle as the main development platform and try to make the initial pilot version completely compatible with Moodle's requirements and "philosophy".

Finally, as a big part of the urban water educational material exists in the conventional form of documents, reports, tutorials etc. it is very important that a transformation will be made in order to convert these files from their conventional to a more interactive format. For that reason a software called Course Genie has been used for the conversion of word files to web-based format. Course Genie is a tool that enables the user to write well-formed HTML pages using the familiar tools and environment of Microsoft Word. The Course Genie software runs within Word, allowing the user to mark-up any documents using the Styles menu. It will build in navigation buttons and an index page if

required, copy pictures and tables and even provide an output zip file suitable for uploading straight to Web.

6. CONCLUSIONS

The initial version of the UWETTT has been developed and uploaded to UNESCO server for the final upgrade by the remaining contribution of the 8 UNESCO IHP VI project teams. The final version will be completed by the end of the IHP VI project (end of 2007).

Moodle software is being used as the main platform of the Urban Water Educational Tool, Course Genie will be used to transform document files from conventional to more interactive web-based format and finally the already developed pilot versions of UNESCO Educational Tool will be used and transformed into a completely compatible with Moodle Platform format.

The UWETT is public domain available from the UNESCO server through UNESCO IHP Secretariat.

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