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IAHR AIRH

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ARE HYDROGEOLOGICAL CATASTROPHES PREDICTABLE?

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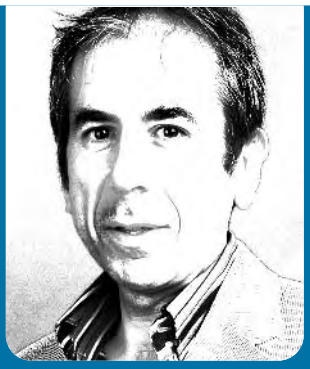
TO BE (EUROPEAN) OR NOT TO BE, **THAT IS THE QUESTION**

EDITORIAL BY MICHELE MOSSA



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On the 27-28th June, 2012 the second Europe Congress of the IAHR is held in Munich. This is an occasion to encourage the exchange of ideas between researchers and engineers from all over the world, but mainly from Europe. Surely it is also an opportunity to take stock of the potential scientific and technical collaborations within Europe.

Europe: how should we interpret this word today? Historically, the first embryonic stage of the present European Union (EU) started with the European Economic Community (EEC), which was created by the Treaty of Rome of 1957. At first it was only an international organisation created with the idea of bringing about economic integration, including a common market, among its six original members - Belgium, France, Germany, Italy, Luxembourg and the Netherlands. The Maastricht Treaty of 1993 established the European Union under its current name. The latest amendment to the constitutional basis of the EU, the Treaty of Lisbon, came into force in 2009. The new name of the EU was chosen to reflect the wider policy base covered by the treaty.
According to the Maastricht Treaty, the former European Community, now the EU, has an obligation to promote harmonious, balanced and sustainable economic activities, a high level of employment and social protection and equal opportunities between women and men, non-inflationary and sustainable growth, a high level of competitiveness and convergence of economic performance, a high level of protection and improvement of the environment, raising the level and quality of life, economic and social cohesion and solidarity among Member States. To achieve this, the EU prepared a set of policies in the following sectors 1) employment and social rights, 2) freedom, security and justice, 3) economics and finance and, of particular interest to researchers and engineers, 4) culture, education, science and technology.

What is the present situation regarding this last point?
The twenty-first century can be considered, even more than the previous one, the century of science, technology and research. Technological development appears today, more than ever, one of the most promising sectors for the future. In Europe, however, research is facing a serious situation. In the absence of concerted corrective interventions, the current trend could be due to slower growth and loss of economic competitiveness in an increasingly global economy. The distance between Europe and other technologically advanced countries continues to increase, also putting the transition towards a knowledge economy further at risk.

What are the reasons which have led to such a critical situation? With the "*Communication from the Commission of the European Communities to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions*" of 2000 it was already observed "that the average research effort in the Union (the differences being significant from one country to another) was only 1.8% of Europe's GDP, as against 2.8% in the United States and 2.9% in Japan. What is more, this gap seems to be on the increase. The difference between total public and private expenditure on research in the US and Europe amounted to some EUR 60 billion in 1998, as against 12 billion in 1992." At the same time, this report observed that "research and technology account for 25 to 50% of economic growth and have a strong influence on competitiveness and employment and the quality of life of Europeans". Furthermore, "if technological progress creates the jobs of tomorrow, it is research which creates the jobs of the day after tomorrow. The current trends in research could therefore have a negative influence on the development of employment in Europe in the years ahead."
It should be remembered that Europe produces a third of the world's scientific knowledge. It is at the forefront in many areas and has had notable success stories in technology. This potential must be maintained, increased and fully exploited, not only for Europe but for the good of the whole world. To better reach this goal, it is important to create or improve 1) a network of centres of excellence, 2) a European approach to research infrastructures, 3) the establishment of a common system of scientific and technical reference, 4) greater coordination between national and European research programmes, 5) closer relations between European organisations for science and technology cooperation.

The EU has been attempting to achieve some of these goals for many years and surely it is possible to judge what has been successful and what has to be improved. This is why in the present issue of Hydrolink you will see an interview with prof. Aronne Armanini, chair of the IAHR European Division and many other articles on the activities of institutions, boards and companies working in Europe and of great interest for the rest of the world. To paraphrase the famous soliloquy from William Shakespeare's Hamlet, it is time to ask the question: "To be (European) or not to be?". Each of us, with our work, may be able to provide an answer to this question, and not simply wait for institutions to do this for us.

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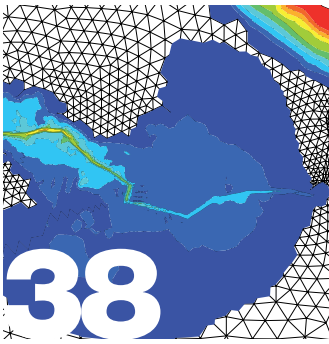


10 QUESTIONS TO...

prof. Aronne Armanini

INTERVIEWED BY MICHELE MOSSA, EDITOR

Prof. Armanini has been Chair of the Europe Division of IAHR since 2008. He is Professor of Fluid Mechanics in the Faculty of Engineering of the University of Trento, Italy one of the top three schools of Engineering in Italy for 15 years. In this University he has been Dean of the Faculty of Engineering and Member of the Board of Governors. He is a founder of CUDAM- Centre of Excellence on Hydrogeological Risks in Mountain Areas. He is external evaluator for various national and international universities and research institutions.

1. Could you briefly explain why the European Division of IAHR was created?

The regional divisions were created inside IAHR to cement the different national communities of members in the different regions, such as the Latin American Division, the Asian-Pacific Division and the Africa Division.

For a long time the IAHR community did not feel the need to create a European Division because the Association was created in Europe and the Secretariat was based in Europe. It should be noted that IAHR has never had a North American Division, presumably because in North America ASCE works as an Association of professionals and university academics specifically devoted to problems of hydraulics and its applications. The European Division was created in 2005 to try to provide a platform to the professional component of IAHR within the region, as an interface to the various hydrotechnical associations active in the different European countries.

Another motivation was to reflect the rapid increase in scientific collaboration within Europe as a result of the European Research Framework Programme and an increasing perceived need to be more influential in helping define future research programmes of the European Commission, especially in comparison with other scientific and technical non-engineering communities, pushing to have more visibility and weight in hydro-environment issues at Community level.

2. Do you think that the IAHR Europe Division is sufficiently active in the engineering and research community?

For several reasons it has always been much more difficult to establish an active dialogue with the professional community than the academic one. Perhaps because, despite good intentions and our efforts in this direction, the professional component of IAHR is numerically small and much more contained than the academic one. Having taken note of these difficulties, the Committee of the Europe Division has identified the new generation as an aggregation point to a new European Community of IAHR, responding to the aspirations of students and young professionals towards the new European research and knowledge area.

3. A recent key action of the IAHR Europe Division is the Europe Congress. Could you tell us the main objectives of this congress?

The Europe Congress was created with the specific aim of providing students of the different doctoral European schools, young researchers and young professionals recently graduated from those schools an opportunity to meet at a reasonable distance and at low cost.

Another important issue is scientific quality so that the Congress would be attractive to researchers and an opportunity to meet with colleagues from other countries in the region.

But the part of the program oriented to the profession is also important. The Europe Congress must be attractive also for the best young professionals, those open to the European labour market.

4. Do you think that these objectives of the Europe Congress have been achieved? If not, in your opinion, what are the main goals still to be reached and how?

The first Congress, organized in Edinburgh by Professor Garry Pender and

his staff in 2010, was very successful with a good participation of young researchers. The quality of the presentations and the discussion was in many cases above average. We must now make an effort to further improve the quality of the Congress and, above all, we must find new formulas so that the European Congress becomes established as an attractive venue for young professionals. I believe, however, that we do still have a long way to go. The Europe Congress should avoid duplicating the IAHR specialist congresses, organized every two year in different countries. It should not be a showcase for the site which hosts the congress.

5. In recent years IAHR membership has shifted from the "old world" (Europe and North Americ) towards Asia, especially Japan, Korea and China. What is your opinion on this point?

IAHR is an international scientific organization, and its major diffusion in all continents has been hailed as a success of the association in accordance with its institutional duties. Besides, research does not have national or regional boundaries, otherwise it is not research. The recent increased involvement of countries like China certainly represents a success of IAHR's recent policy. I believe that we must continue with conviction and determination in this direction, knowing that Europe will, however, continue to provide an important role in this framework.

6. Do you think that Europe is losing its former role in the world scientific and technological communities?

Europe with North America has had a determinant role in the birth of the IAHR, but, especially after the second world war, IAHR, with the committed support of the European members, has aimed to give the Association a much wider geographical structure. Widening horizons has represented an enrichment for Europe. The current problem for European members is to insert IAHR in a more consistent and active way in the newly-active European arena of research and advanced education.

7. One of the big resources for the future is the scientific and technical communities of young engineers and researchers. What are the main actions of the Europe Division on this point?

The Europe Division Committee is convinced that one of the strategic targets of the Division is to make it clear to the community of young professionals and scientists that IAHR can be their association. To do this, we must clearly indicate the benefits that they can obtain as members of IAHR. For the scientific community, and in particular for students of doctoral schools, IAHR must offer a network to facilitiate contact between students doing research in the same scientific areas, make them able to communicate, to exchange ideas and information, and if possible to cooperate. These contacts may be virtual, but also real: Europe is sufficiently small and equipped with an extensive network of transportation in order to make possible internal mobility within the region at low cost. This is certainly one of the objectives of the Europe Congresses. We should act in the same manner also towards young professionals, offering them opportunities to enhance and improve the impact of their professional activity. This second objective is less straightforward, but again the Europe Congress should be structured in such a way as to be useful in this regard.

8. The European Union funded Hydralab Concerted Action is a network of research institutes started in 1997 within the context of the EU Research Framework Programme, to enhance access to physical modelling laboratories. After about twenty years it is possible to take stock of Hydrolab. What is your opinion on this action?

The project was established by the major European hydraulics laboratories to provide access to researchers throughout Europe to their large installations. The project has been very successful in fomenting cross-European collaboration and breaking the former historic national boundaries. In the current phase IAHR has become a formal partner in this project to help in dissemination of the results of the project and we hope that we can help give permanency to this network once the current funding phase is completed.
Through our Congresses and publications we can help promote transnational actions such as Hydralab.

9. We often talk of American, Chinese, Russian, Indian, etc. scientific communities. Do you think that it is possible to identify a European scientific community, or the idea of European science? If not, what other actions are needed for this purpose and how can the Europe Division of IAHR work to achieve this goal?

I think the term "Scientific community" refers basically to a community of people who share the same objectives, methods, and opportunities of meeting within the framework of scientific research. In the case of Europe, there is no doubt that there is an historic tradition of reciprocal action and relations between scientists of different disciplines. Suffice it to say that the first universities 10 centuries ago (Bologna, Sorbonne, Prague, etc) were supra-national institutions of a European dimension. In this respect, speaking of the regional scientific community is rapidly losing significance, in that the scientific community has acquired an international dimension and this applies to all national or regional communities. However, in the case of Europe this regional dimension is gaining importance especially in respect of the EU's initiatives in order to establish the European space of culture and higher education. The European Division must work in this direction especially with respect to the young generation, and through the Student Chapters.

10. In the last few years the EU countries, as with many other countries, have faced a hard economic crisis which starts to have repercussions on the scientific community. On this point is there anything else the scientific EU communities and the Europe Division of IAHR can do?

The economic crisis is not a phenomenon only in Europe, but is hitting countries in all continents, in particular the USA and Japan, and previously some countries in South America. In a period of crisis we must invest in culture. The EU member states are doing it. In the area of hydraulic engineering and hydro-environment science, the Europe Division can and must play a very active role especially in co-operation between different EU countries. This role will be much more effective, if we will be able to create an effective cooperation between the various components: universities, research agencies, large labs and professional associations. This is one of the most important tasks, more difficult and challenging of the Europe Division Committee.

FROM COMMERCIAL DISTRIBUTION TO AN OPEN SO

THE CONTINUING STORY OF THE TELEMAC HYDRO-

BY JEAN-MICHEL HERVOUET

Jean-Paul Chabard
EDF R&D Project Manager
IAHR Vice President

EDF is an Institute Member of IAHR

Foreword

The beginning of this century saw the increasing development of software under the Open Source License. It was a real change of paradigm for sharing knowledge, radically different from the usual commercial approach. Why is the Open Source model attractive for a large company such as EDF?

First, it was a real opportunity for sharing feed-back on our codes and improving their validation. By encouraging use at the limit of the validation domain, it is also a way for extending the validation domain. The Open Source Community developing around our codes is also a good way for sharing development of new functionalities, attracting new ideas or coupling with other codes. Of course, the Open Source license is especially interesting for collaborations with academics but it is also attractive for industries wanting to master the development of specific models.

But Open Source is also relevant because we think that the solver by itself has and creates no value. It is the ecosystem around the solver which creates the value. Moreover Open Source codes welcome wide international collaboration and are especially attractive for young researchers. All these elements explain why the Open Source model is now the basis for developing and sharing scientific software at EDF R&D.

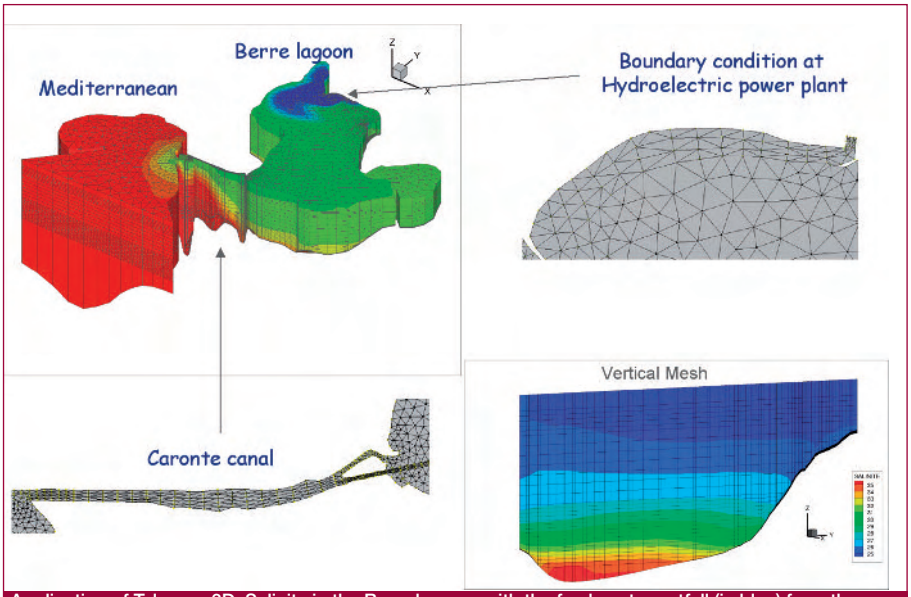
For downloading EDF Simulation software go to: http://research.edf.com/research-and-the-scientific-community/software/software-44329.html

URCE EUROPEAN CONSORTIUM:

INFORMATICS SYSTEM

In the beginning, let's say in the seventies, an amazingly large number of computer programmes for hydraulics coexisted, generally used by an amazingly small number of people. The Electricité de France (EDF) R&D division of that time could boast 6 different programmes, and as many authors, just to solve the shallow water equations. Such programmes were rapidly built by a trainee, a PhD student or an engineer, they had a limited range of application and a limited lifespan. At the same time a famous folk artist began to sing: "The times they are a changin'", and things gradually became more complicated. Computational Fluid Dynamics and Computer Engineering emerged as new disciplines. Team work and collaborations imposed new schemes of organisation. New architectures, such as vector processors and parallelism, required new ways of programming. New and strange words like "GUI" or even "validation" popped up. It became obvious that what were soon to be called hydro-informatics or hydro-science systems could only be the product of long-term collaborative work. It then appeared that building such complicated tools not only required money and a panel of specialists in various disciplines, but also what they were designed for: users.

Thanks to a continous funding by EDF, the Laboratoire National d'Hydraulique et Environnement (LNHE) was able to sustain across many years a project that was the framework of the Telemac hydro-informatics system. It started in 1987 with a shallow water equations solver that was called Telemac-2D, mostly because it was inspired from a Navier-Stokes solver called Ulysses and an Euler equations solver called Mach-1. Initially based on curvilinear coordinates, it rapidly evolved to finite elements and unstructured grids, and was complemented with Telemac-3D for free surface Navier-Stokes equations, while waves and sediments were also being tackled. In 1993 the commercial distribution started, first ensured by Sogreah, soon to be joined by Hydraulic Research Wallingford (HR Wallingford) and the Canadian Hydraulic Centre (CHC-NRC). Specific conditions were allowed for research purposes. The benefits then clearly appeared to be not only an extra funding, but also an extra manpower, as new developments stemming from PhDs brought important pioneer works. This is how parallelism with domain decomposition and non-hydrostatic Navier-Stokes equations came to life. However, making money with software is not the main concern at LNHE.



Application of Telemac-3D: Salinity in the Berre lagoon, with the fresh water outfall (in blue) from the Saint-Chamas power plant.

Jean-Michel Hervouet **is a senior research engineer at Electricité de France and has spent all his carrier in the Laboratoire National d'Hydraulique et Environnement. He dedicated himself since 1987 to the development of the Telemac hydro-informatics system. He is the author of "Hydrodynamics of free surface flows", published by Wiley in 2007.**

Environmental studies, and design related to security of dams and power plants are the core work, it requires using the best and most fully validated available software, a broad recognition and the confidence of the security authorities. Hence the nagging question: how to get international recognition if your software is hidden and protected against copying, and if your algorithms are kept secret? This is where the concept of commercial distribution vacillated, when the profit of hundreds of paying customers was opposed to the benefit of thousands of free users. Eventually, to improve access to Telemac for the whole community of consultants and researchers, the decision was made in 2009, after 16 years of the fee-paying era, to move to freeware and open-source. A core group of European partners readily embarked with us on this new adventure, with a commitment to provide manpower and a right to participate in decisions. This new consortium is today composed of:

- Artelia group (formerly Sogreah, France),
- BundesAnstalt für Wasserbau (BAW, Germany),
- Centre d'Etudes Techniques Maritimes et Fluviales (CETMEF, France),
- Daresbury Laboratory (United Kingdom),

As the developer of the industry's first Acoustic Doppler Current Profiler (ADCP), with nearly 30 years of experience designing the products that have set the standard for river flow and discharge measurements, Teledyne RDI once again raises the bar with their revolutionary new **RiverRay** ADCP.

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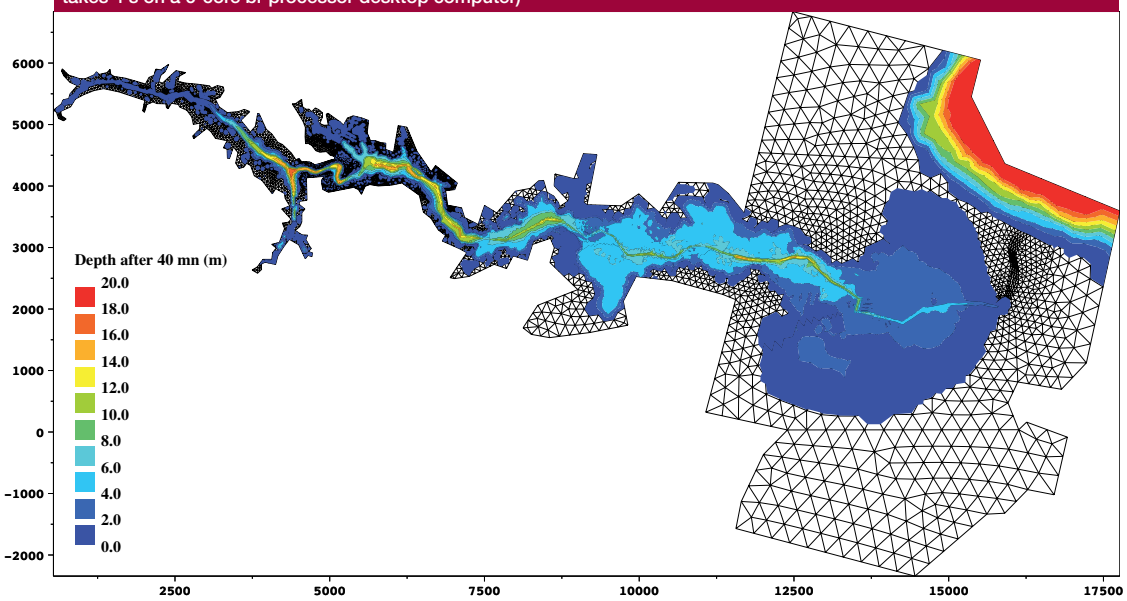
Simulation of the Malpasset dam break flood wave in 1959, with a 26,000 elements mesh (the run, 1,000 time steps of 4 s, takes 4 s on a 6-core bi-processor desktop computer)



- Electricité de France (EDF, France) ,
- HR Wallingford (United Kingdom).

Anyone can thus now download Telemac on our Website (www.opentelemac.org) and assess its performance.

The software suite is currently composed of:
- Telemac-2D (Shallow Water or Saint-Venant equations, Boussinesq equations)
- Telemac-3D (non hydrostatic Navier-Stokes equations)
- Sisyphe (sediment transport)
- Tomawac (wave climate)
- Artemis (agitation in harbours)

Soon there will be also: Mascaret (1D Saint-Venant equations). Groundwater flows are also dealt with but are not yet distributed.

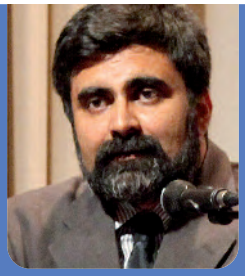
User interfaces are provided by partners, such as Fudaa-Prepro (CETMEF) and Blue-Kenue (CHC-NRC).

Paradoxically, providing freeware appeared to be more difficult and demanding than selling. The software may be installed on every kind of system, be it Unix, Linux or Windows, the Fortran 90 sources may be compiled on any compiler. This is not quite like downloading a mere executable file on a PC. Installation is no longer done by trained professionals but by the users themselves, possibly absolute beginners, and there Murphy's law begins to rage. If any detail can go wrong, it will, as there is always one user to see it, and it helps! This is how we realised that the evolution to freeware was a full success, by observing with mixed awe and pride the growing number of questions on the assistance forum. After two years, more than 2,500 users joined, and the forum is crammed with 4,000 messages. The hundreds of customers have duly turned into thousands of users. Small consultants have access to software they could not afford before, Engineer schools and Universities can equip their class-rooms, isolated students are able to start PhDs, and a flood of remarks helps improve the product. Fortunately former distributors, now members of the newly-created consortium, play the game and provide substantial help on the forum, regardless of the fact that they still propose fee-paying assistance contracts. The minimum input to maintain the project is indeed high, but progress is still eagerly wanted and it is boosted by freeware. From the first steam-powered cars to our sophisticated modern vehicles, there was a tremendous progress and yet everybody is fully convinced that more research is needed to improve them. So is the case with hydro-informatics, and we should honestly admit that we are not so advanced as the car industry. The progress of numerical modelling was however dramatic. The simulation of the Malpasset dam break flood wave, a run that lasted 24 hours in 1993, takes today 4 s: thanks to the progress of machines, algorithms and parallelism. Who could think 30 years ago that we would now compute in a few hours the 10-year evolution of morphology in a 100 km long tidal estuary, with full coupling with hydrodynamics and time-steps of a few seconds, or that we would run 13 years of water quality in a lagoon? Users push forward and immediately take advantage of improve-ments to venture into even longer, more refined and more complex applications, that will require new efforts, and we do not see the end of this ongoing process. We are always very proud of every new version, but every new breakthrough finds us less proud of the previous version. New challenges appear, such as interoperability. New architectures constantly change the deal, like GPUs recently. This rising complexity becomes itself a problem: who can encompass and manage such big and intricate constructions? Simple and partly unanswered questions like "what is the accuracy of our results?" show us that we still have a long way ahead. Yet the pioneer time has not vanished. Besides a handful of hydro-informatics systems, there is still a large diversity of computer programmes based on an amazing number of different techniques, though they are mostly used for education or publication. The "not in my backyard" syndrome is still thriving, but new rules are here to stay: it is a desperate approach to start from scratch like in the 70s, and hydro-informatics will now only progress with well-established long-term projects, with large teams and collaboration of big organisations, and with large numbers of supporting users. We are convinced that in the future such collaborative work will be closely linked to freeware and open source. We are also convinced that Europe will play an outstanding role in this domain. Don't think twice…

For more information on Telemac Open Source visit www.opentelemac.org

INFLUENCING TEACHING STYLES FOR A BETTER LEARNING EXPERIENCE: HOW UNESCO-IHE USES DIDACTIC TRAININ

BY ASSELA PATHIRANA



Assela Pathirana **has been a faculty member at UNESCO-IHE since 2006. He is a civil engineer, with a background in Urban-hydrology, hydrometeorology and hydroinformatics developed during his masters, PhD and post-doctoral research. His main research interests include urban flooding and drainage, rainfall process, Asset Management and Climate Change. In recent years he has developed a keen interest on pedagogy at post-graduate level education.**
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UNESCO-IHE Institute for Water Education is an international post-graduate education Institute situated in Delft, the Netherlands, which implements MSc programs, PhD programs and a number of short courses for professionals in the field of water and environment. As part of UNESCO, the vision of the institute is to contribute to "*a world in which people manage their water and environmental resources in a sustainable manner, and in which all sectors of society, particularly the poor, can enjoy the benefits of basic services*". The development relevance of the Institute is also stated in the Institute's mission to "*contribute to the education and training of professionals and to build the capacity of sector organizations, knowledge centers and other institutions active in the fields of water, the environment and infrastructure in developing countries and countries in transition*". UNESCO-IHE has been in the business of water education for fifty five years (until 2003 it was known as IHE-Delft). Over this period of more than half a century, the institute has evolved in its character in a number of ways. The institute initially started with the scope of hydraulic engineering, and later expanded into the fields of sanitary engineering, drinking water and later into environmental engineering. From the ontset the focus has been on training professionals from the so-called global-south, contributing to its change and growth. A decision taken at the 31st general conference of UNESCO (2001) transformed UNESCO-IHE into a truly international institute which became operational in 2003, making UNESCO-IHE the only institution in the UN system authorized to confer accredited MSc degrees. By 2012, UNESCO-IHE has graduated nearly 15,000 water professionals from some 162 countries. This year it has 372 MSc candidates (two batches 2010-2012 and 2011-2013) from 72 countries. Currently it also hosts some 130 PhD researchers and some 20 post-docs, with a lively research program. Every year approximately 700 individuals participate in short-courses conducted by the institute. Currently UNESCO-IHE employs more than 90 faculty members from across the globe who conduct teaching and research supervision of MSc and PhD candidates.

UNESCO-IHE
Institute for Water Education

UNESCO-IHE is an active Institute Member of IAHR, which will be host for the IAHR World Congress in The Hague in 2015. Prof Arthur Mynett is Head of the Department of Water Science Engineering at UNESCO-IHE and is an IAHR Council Member. Dr Ioana Popescu is Senior Lecturer in Hydroinformatics and Chair of the IAHR Education and Professional Development Committee, and Dmitiri Solomatine, Professor of Hydroinformatics is a member of the Hydroinformatics Committee.

Objectives and Challenges

The subject matter of UNESCO-IHE's education, namely that of water and environmental issues, is by nature broad, local-specific, unique and multidisciplinary. Solving water problems calls for skills that go beyond the knowledge that could be expected to be obtained by studying a single discipline, as well as needing well-developed integrative skills and a mix of competencies. Largely due to tradition, world-wide higher education programs related to hydraulics and hydrology still remain very much `discipline-oriented' entities: They focus mostly on the fundamental knowledge of processes, theories and models, but often pay little attention to training students in the art of applying these to real-world problems[3].

G TOWARDS **IMPROVING WATER EDUCATION**

UNESCO-IHE has recognized the importance of providing an education that produces graduates who are equipped to solve real-world water problems and continually attempts to improve the problem-oriented nature of its academic programs.

The knowledge base in water-related disciplines is increasing rapidly. New knowledge is appearing at a rapid rate making the time after which old knowledge becomes outdated very short. The required breadth of knowledge for success as a water professional is increasing too. It is no longer sufficient to be an expert who 'qualified' at some point in the profession. Continuous learning has become an extremely important attribute of a successful water professional and to enable this, graduates of higher-degree programs need to possess a different mix of knowledge, skills and attitude than traditionally expected. For example, the skill and positive attitude for continual learning -- or 'to learn how to learn' has become important in constructing knowledge. Developing 'personal competencies' to learn through and within practice is ('learning by doing') is crucial to ensure professional success[5].

The vast majority of these students are mid-career professionals who, upon graduation, return to their countries and often play important roles in shaping policy and practice in the water sector in these countries. The fact that the graduates of UNESCO-IHE end up working in diverse geographical, economic and cultural settings makes it even more important to focus their education on the development of skills and competencies.

Among the faculty of UNESCO-IHE there is a general consensus on the importance of developing life-long skills and attitude for continuous and 'on-the-job' learning. A number of steps towards implementing a 'learning atmosphere'

> **Continuous learning has become an extremely important attribute of a successful water professional**

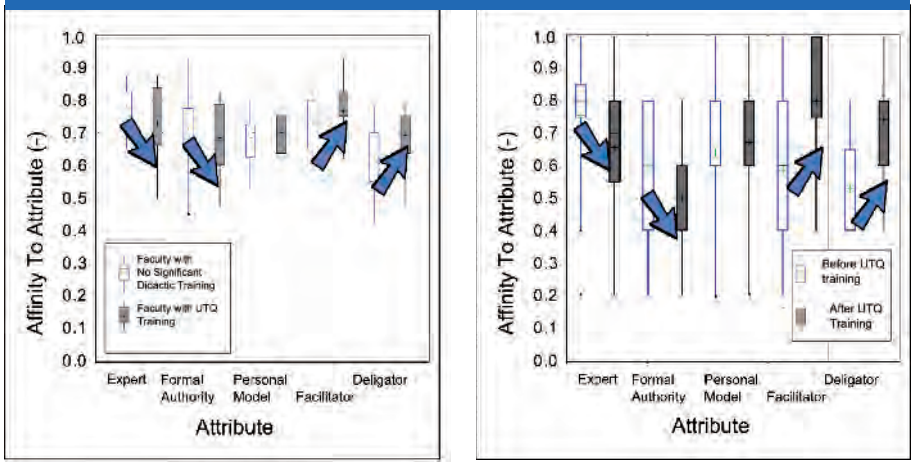
that is conducive for this goal has been taken in recent years. For example classroom facilities were transformed to structures that are conducive for group-studies and interactive activities and a number of small-group workplaces are made available throughout the building. Each student is now provided with a laptop computer to use with the wireless network throughout the institute, including the classrooms. Together with a dynamic learning management system and personal learning environments this infrastructure provides a basis to foster communication, teamwork and learning [3]. However, most fundamental changes are affected at the level of teachers. We are attempting to positively influence teaching styles of the teachers, which we trust is the cornerstone for the scheme of providing an education that matches with the challenges in the water-world.

Starting with Teachers

As stated above it is essential that UNESCO-IHE graduates are able to keep abreast of the latest knowledge in their field and are able to work in teams efficiently and effectively. For optimal results, these real-world needs have to be reflected and even mimicked in didactical approaches. To instill in the student an ability for active learning, the faculty members of

UNESCO-IHE are offered training on didactics based on the principal of `constructive alignment'' which starts with the notion that the learner constructs his or her own learning through relevant learning activities[1].
The need for shifting the approach for teaching can be expressed using the five teaching styles proposed by Anthony F. Grasha, namely: expert, formal authority, personal model, facilitator and delegator[2].
The expert teacher is mainly concerned that the students receive correct information and are well prepared in their discipline. A main disadvantage is that it focuses more on the outcome than on developing the thought process leading to that outcome. The formal authority teacher focuses on following the relevant standards of practice in the concerned discipline. A personal model teacher focuses on setting an example rather than prescribing. The feeling of inadequacy if unable to live up to the standards of the instructor is a downside of this approach. Lastly, the facilitator and delegator styles portray the teacher as a guide, encouraging students to explore knowledge. Less experienced students as well as those unused to this approach may feel confused and directionless with this autonomy.
The traditional university teaching had a substantial focus on expert/formal-authority type of teaching where teacher is seen as the main source of knowledge and factual information. On the other hand Facilitator/Delegator styles portray the teacher as a guide, encouraging students to explore knowledge, which encourages developing skills and aptitudes towards continued learning. Therefore using Grasha's framework, the needed shift can be expressed as evolving more towards the facilitator/delegator styles away from the expert/formal-authority styles.
In order to achieve this shift, and starting from 2010, faculty members of UNESCO-IHE are currently offered a didactic certification program named University Teaching Qualification (UTQ), a programme aimed to develop the didactic skills of the teaching staff in the direction of facilitating active learning in higher education. The UTQ program focuses on constructive alignment where the student constructs her/his own learning through relevant learning activities. It stimulates the lecturer to create a learning environment that supports the learning activities appropriate to achieving the desired learning outcomes. In other words, the UTQ training intends to stimulate UNESCO-IHE faculty to develop facilitator/delegator teaching styles.

Figure: "Learning to give student space to learn" The difference of expert/formal authority and facilitator/delegator traits among a) Faculty with UTQ training and those who did not have significant didactic training (left) and b) Faculty before and after UTQ training. (Adapted [3])



Giving Space to Learn

The main objective of the UTQ program was to train faculty members to be better facilitators and delegators. After running the UTQ program for two years and producing about 20 graduates, we were interested to know the impact of the program. An important logical step in this direction is to understand the profile of the faculty in relation to UTQ and didactic training in general. To attempt this, we conducted two surveys among the faculty members of UNESCO-IHE. The first was based on a popular survey instrument proposed by Anthony F. Grasha comprising of 40 statements (Teaching Styles Inventory: Version 3.0, Grasha, 1996) for which the respondents have to give a rating from a scale from 1 to 5. Example statements are ''I typically show students how and what to do in order to master course content'' and `Students might describe me as a `storehouse of knowledge' who dispenses the facts, principles, and concepts they need''. Grasha's teaching style inventory allows translating the results into an affinity rating for each teaching style. We supplemented the first survey with a follow-up among the 20 UTQ graduates. We used respondents' own assessment of their affinity to each of the five teaching-styles before and after UTQ training.

The two surveys show a remarkably similar outcome (See figure). In essence we have become more facilitators and delegators after undergoing the University Teaching Qualification training. This is the intended result of the UTQ training.

Discussion

What the UTQ training program at UNESCO-IHE is proven to have achieved is a shift from an expert/formal authority style towards a more facilitator/delegator style as measured ***from what teachers*** think about their teaching styles. Needless to say that what really matters is whether this is really practiced by teachers in the classroom. While there is informal evidence that they do, it is very much necessary to conduct a formal study to confirm this. A much more complex subject is how this shift is perceived by the students. Being used to a learning experience in predominantly expert/formal-authority styles at the schools and universities in their home countries, some of our students might find it difficult to adjust to the 'new style' of learning. We are continuously exploring ways of obtaining concrete information on classroom experience both from the student and teacher perspective and to measure the effectiveness of the modern approaches to teaching in instilling in students the affinity and skills for life-long learning.

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ARE HYDROGEOLOGICAL CATASTROPHES PREDICTABLE?

A SHORT PERSPECTIVE ON THE IMPLEMENTATION OF THE FLOODS DIRECTIVE

BY CORRADO GISONNI

Flooded district in Genoa (Italy), on November 4th 2011 (source www.rai.it)

The title of the present article recalls a booklet written by the French geologist Marcel Roubault more than 40 years ago: Peut-on prévoir les catastrophes naturelles? (Can we predict the natural catastrophes?). Modern society is asking for definite answers and statements about this dramatic issue of the Third Millenium.
In recent decades, the Old Continent was systematically hit by biblical floods and devastating hydrogeological phenomena, with tremendous effects in terms of the numbers of victims as well as financial losses. If we focus our attention on Floods and Mudflows, the figures are terrific, as confirmed by the records available from the International Disaster Database (Centre for Research on the Epidemiology of Disasters, CRED, Université Catholique de Louvain - UCL, Brussels, Belgium; http://www.emdat.be):
- from 1980 to 2011 the total amount of estimated economic damages is roughly equal to 100 billion US Dollars;
- during the last three decades, more than nine million people were affected by destructive hydrological events, with more than six thousand victims;
- more than 500 events occurred during the last 60 years, with a definite trend showing a significant increase in the number of events per year over the last two decades (Fig. 1).

On October 23, 2007, the European Parliament approved the so-called 'Floods Directive' 2007/60/CE (hereafter referred to as the FD), aiming to regulate the procedures for Hydraulic Risk assessment within the borders of the EU member States. The implementation process of the FD involves 27 countries and 110 River Basin Districts (RBDs), including 40 transna-

tional and eight extra-continental districts, and is structured according to three main steps and their corresponding deadlines (Fig. 2).

Given that flood risk management is an integral part of Integrated River Basin Management, these stages are coordinated and synchronised with the Water Framework Directive (WFD - Directive 2000/60/EC); a crucial intermediate deadline is fixed on the 22nd of December 2012 for starting the 'Public participation process' and the active involvement of interested parties in the risk assessment/management procedures (FD, articles 9.3 and 10, in coordination with article 14 of the WFD). All of the above-mentioned steps will be cyclically reviewed every 6 years.

"European legislators probably overlooked the economic impact of the FD. The costs for the full implementation of the FD may be roughly estimated equal to 450 – 900 M€"

No official information is actually available about the Member States having fulfilled the first important deadline.
The road to the 2015 deadline is certainly intricate and presents many difficulties that may threaten the full application of the European legislation. Here following, a list of the main aspects to be considered is presented:

- **Hydro-diversity.** River Basins in Europe present a wide heterogeneity in terms of hydrogeological and hydraulic characterization; as a consequence, flood events may be associated to a very different phenomenology, depending on the geographical region of occurrence. For instance, the European territory suffers the inundation of floodplains for large rivers in Central Europe, as well as flash floods in the Mediterranean basins, not to forget other peculiar events, such as hyper-concentrated flows, ice-jam floods and submersion of endorheic basins. This circumstance may affect the definition of global approaches for the risk assessment and flood management policies to be applied all over the European territory.
- **Event probability.** Article 6.3 of the FD defines three different scenarios for the definition of the 'flood hazard maps': (a) extreme events (low probability), (b) medium probability floods (return period ≥ 100 years), and (c) high probability floods, to be considered where appropriate. No specific guidelines are provided about the selection of return periods; for instance, the Italian implementation of this item (D.Lgs. 49/2010) establishes three return period ranges, T up to 500 years (low probability), 100 ≤ T ≤ 200 (medium probability), and 20 ≤ T ≤ 50 years (high probability). Furthermore, a River Basin District usually incorporates several regional River Authorities with outlined hazard and risk maps based on different assumptions of the return period value, within the same hydrogeological context! Hence, it is mandatory to coordinate hazard maps at regional and sub-basin level, in order to ensure the homogeneity of flood management actions across the entire river district.
- **Hydraulic modeling.** The article 6.4 of the FD establishes that, among other elements, flood hazard maps shall also specify the flow velocity or the relevant water flow, for each scenario. In principle, this kind of evaluation requiries the use of 2D hydraulic models, whose application is strongly dependent on the availability of an extensive digital terrain model (DTM), besides robust computational resources. Undoubtedly, in many cases the recourse to shallow water equations could result in overshooting the technical target.
- **Mitigation strategies.** Flood Risk Management certainly represents one of the most important challenges introduced by the FD. In this regard, it is crucial to focus attention on the selection of optimal strategies in order to balance Structural / Non Structural countermeasures. Once again, these strategies can only be site-specific and depend significantly on the peculiar typology of a hydrogeological event; for example, traditional Early Warning techniques may be ineffective for particular phenomena characterized by a small time scale, such as flash floods along the Mediterranean coast.
- **Implementation costs.** European legislators probably overlooked the economic impact of the FD. Most of the RBDs and public institutions are not adequately equipped in terms of human and financial resources to cope with the Directive targets and its corresponding time schedule. The costs for the achievement of the FD milestones may be roughly estimated equal to 100-200 k€ per 1.000 km^2, depending on the starting level of knowledge. In total, for the whole European Territory a total amount of 450 – 900 M€ is requested. Although this financial effort

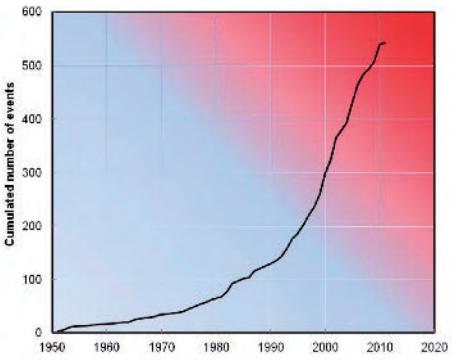

Fig. 1. Cumulated number of destructive hydrological events (1950-2011)

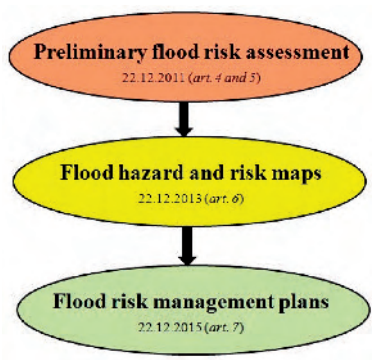

Fig. 2. Implementation steps of the Floods Directive

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seems to be impressive, it represents a worthwhile investment for EU Member States, when compared to the financial losses suffered during the last decades.

- **Stakeholders.** FD does not introduce any definition of "interested parties", although these are heavily involved within the 'Public participation process'. An adequate set of stakeholders should definitely be delineated, in order to deliver a constructive contribution to the implementation process. An excessive involvement of governmental and public authorities could cause dangerous detachment from the population, with consequent problems for the real application of the flood management policies; on the other side, civil associations should be carefully selected in order to prevent the addition of sterile conflicts to this important decision process.

A final word on the professional competences that are indispensable to drive the process, based on an adequate technical and scientific background. On November 3, 2011, the Italian city of Genoa and some villages along the Liguria coast were traumatized by an "exceptional" event; heavy rainfalls generated enormous flash floods, which propagated from the surrounding steep natural catchment and struck the urban areas (Picture page 46). Six people died.

As usual, in the following days, several 'specialists' on flood phenomena and hydraulic risk assessment (meteorologists, geologists, lawyers, etc.), beside poets and show-girls, illustrated their opinions and comments through the mass media; none of these had a basic knowledge in Hydraulic Engineering!

In particular, many geologists took over the scene, presenting theories and considerations without any technical or scientific background about water sciences. This is certainly not an Italian peculiarity, similar episodes have occurred also in other European countries.

Some spontaneous questions arise. Are European governments and public opinion aware of the professional competences of hydraulic engineers? Is the European Community investing sufficient resources for the formation of qualified hydraulic engineers to cope with water issues in the Third Millennium? Moreover, too often the FD shows vague statements (i.e. where appropriate, as appropriate, etc.); who is entitled to establish the appropriateness or correctness of some decisions and assumptions? These issues should definitely fall under the responsibility of 'renowned experts' that are able to carry the weight their decision, i.e. authoritative professionals instead of authoritarian officers.

As a concluding remark, it is possible to delineate a likely answer to the original question of this article: are hydrogeological catastrophes predictable?

We cannot predict everything about hydrogeological catastrophes, but we can do much more to mitigate their consequences!

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SOLUTIONS FOR SUSTAINABLE NAVIGATION IN SOUTH EAST EUROPEAN WATERWAYS. ECOPORT 8 PROJECT

BY ADRIAN STANICA

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A little less than three millennia have passed since ancient merchant ships raised their anchors and started to sail from the Aegean and Asia Minor to the Adriatic and Eastern Mediterranean – as well as to the Black Sea coasts. Sailing mile after mile, year after year and coast after coast, a living network of trade, culture and civilization was born and started to grow from Italy over the Balkans to the western Black Sea. This network – which grew from navigation into a true, unique and significant culture – has never ceased to exist ever since.

Figure 1. Map of ECOPORT 8 ports – mainly along European Transport Corridor VIII (Picture from from www.ecoport8.eu)

Even more, since Ancient Greek, Roman and Byzantine times it has crossed and developed continuously, witnessing also Norman, Arab, Ottoman but also Soviet rules – for at least some parts of the area. Nowadays the common past and history have been reunited under the new era of the European Union – to which all the countries in the area are either members or associated.

The last century witnessed also the dramatic increase of human pressures on the environment, with more than half of the global population being concentrated along the coast. And – as always in time – shipping has been one of the most important activities along the coastal zone. The overwhelming human pressures on the coastal environment have demanded action in order to stop ecological destruction. Plans for environmental protection started to be developed and various local ideas have been translated into reality in some parts, while the difficult recent economic past for some countries from the area have not allowed to keep pace. A common ecological framework for navigation and port activities has become acutely necessary for the entire area.

This is why ECOPORT 8 was born – as a joint South East European effort to develop a common set of rules. These rules aim to allow the sustainable development of port activities by soundly ensuring environmental quality in a coherent and regionally sound way. The project – developed within the framework of the SEE (South East Europe) Programme – coordinated by the European Union Directorate General (DG) REGIO-, groups together universities, research institutes and harbor administrations from Italy, Montenegro, Albania, Greece, Bulgaria and Romania, covering the European Transport Corridor No. 8 (see Fig. 1), not by accident coinciding with Emperor Constantine`s Road from Rome to Byzantium.

So – what is it all about? The greater goal of ECOPORT 8, is to protect the coastal-marine environment while allowing and improving shipping and harbor activities in South East Europe, can be split into the following main objectives:

- Improve the quality of ports, placing the prevention of pollution and preservation of natural resources in port areas and nearby coastal zones as pivotal to the maritime system.
- Focus towards an environmental certification for PAN-EU corridors and port networks in all their complexity, through the drawing up of shared and common guidelines (according to UNI EN ISO 14000 standards and EMAS)
- Supply port authorities within the ports of the South East European area with the relevant tools for better environmental management, overcoming current difficulties in the field such as: the lack of specific environmental regulation, fragmentation and the non-homogenous nature of the solutions adopted by single ports.

Taken step by step this can be translated into the following specific goals:

- Definition of a single shared trans-national and sustainable protocol, establish control

Figure 2 – Comparision of the Limit Value for contaminants in dredged sediments among Eu coutries.

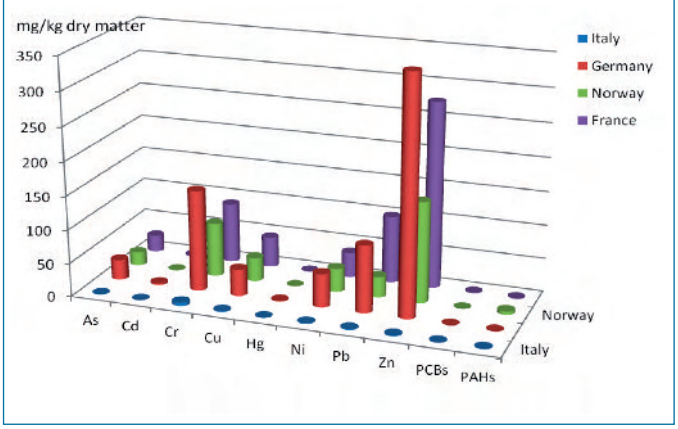

Figure 3 - Horizontal velocity reproduced by a numerical hydrodynamical model called used in the Bari Port Aquatorium at 12:00 am of 24 February 2010, at a depth of 4m.

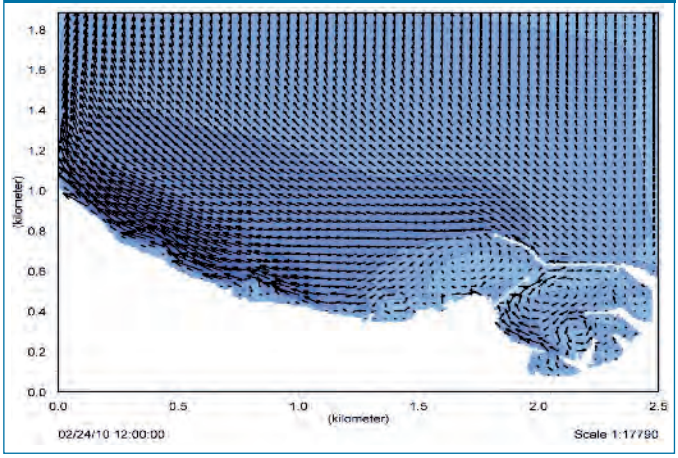

Table 1. SWOT Analysis for ports within ECOPORT 8 Project. Strengths and opportunities

Strengths		Opportunities
• ***Available programmes and technological documents for environmentally sound management of ports according to the national, European and International environmental legislation*** • ***Basic administrative structures created at local level for implementation and enforcement of environmental legislation*** • ***Change in structure of cargo turnover in ports leading to decrease of the unhealthy impact on environment in port area*** • ***Initiatives of port authorities taken to protect the environment*** - implementation of a project environmental monitoring (Ports of Bari, Constanta) - environmental protection activities to a specialized, well equipped companies - established integrated information system regarding the collection of waste from ships (Port of Bourgas) - no bunkering services within the port; No nearby industry to the port (Durres) - communication policy and practice for informing the society about initiatives taken to protect the environment (Port Igoumenitsa) - introducing of Environmental Management System (EMS) (Port of Constanta)	LEVERS FOR DEVELOPMENT	• Legislation - developed national environmental legislation and programs harmonized with the EU environmental acquis communautaire • ***Government policy and better management of environmental protection in state*** - improved integration of the national sector policies, including transport policy, with the national environmental policy - implementation of a port-oriented environmental policy - established and functioning basic administrative structures at central and local level for implementation and enforcement of environmental legislation - legally established system for monitoring and control of the activities for environmental protection - increased demands on protection of the environment in the area around the ports in order to develop priority sectors for the country. • ***Financial support*** - availability of EU financial instruments for support of EU port operations management and environmental protection - participation in international projects - interest from financial institutions to credit the branch

Table 2. SWOT Analysis for ports within ECOPORT 8 Project. Weaknesses and threats

Weaknesses		Threats
• ***The absence of well functioning system for environment management (EMS) in line with the international standards*** • ***Lack of modern system for environment pollution risk assessment*** • ***Weak integral policy for sustainable development of the ports based on the Integrated Coastal Zone Management (ICZM) approach*** • ***Lack of sufficient administrative capacity to implement the requirements of the regulations*** • ***Ineffective utilisation of raw materials, supplies and energy*** • ***Limited internal financial resources to ensure environmentally sound operation of the port*** • ***Lack of self-monitoring system for particular components of the environment affected by port activities***	OBSTACLES TO OVERCOME	• ***Legislative shortcomings*** - too complicated and fragmented environmental legislation - insufficiently effective economic incentives and sanctions for environment protection - lack of a specific environmental policy regarding the port area (beyond the policy introduced by the Greek legislation); - high cost of environmental law enforcement and poor enforcement of the regulations • ***Lack of coordination and integrated management of the coastal zones*** - mismanagement and insufficient communication and coordination between institution and other stakeholders responsible for implementing the legislation in the port • ***Deterioration of the conditions*** - deterioration of the condition in some ecosystems inc. their biodiversity, which will incur more stringent requirements or issuing permits and EIA for the port; - expected increase in ship call and cargo turnover in the ports, which is a potential danger to environmental protection; - resisting bad practices

and monitoring standards within the ports (according to UNI EN ISO 14000 standards);

- Set up of a permanent PAN-EU network to develop, strengthen and transfer coordinated initiatives of cooperation for eco-management of PAN-EU corridor ports;
- Identification of common innovative tools (preventative approach), to define environmental and social risk conditions, and reducing risk perception;
- Development of cooperation among local authorities, citizens and enterprises of SEE area, stimulating growth, employment and environmental policy;
- Training of new professionals on the design and environmental management of port areas;
- Creation of a virtual environmental certification for PAN-EU corridors and port networks in all their complexity.

As the ECOPORT 8 project, which started in 2009 is getting close to its end, there is a significant amount of results which have helped better understand the "bigger picture" regarding the environmental aspects in the ports from Corridor 8. Probably the most synthetic results are grouped in the SWOT analysis covering the entire area. Table 1 contains the levers for development, overall strengths and opportunities of the region, as well as best practice examples. Table 2 groups in a synthetic manner the overall weaknesses and threats, putting them as targets for future action aimed to improve the environmental quality in ports.

Many other legal, technical and scientific data required for the establishment of environmental policies in the ports have been highlighted by the project ECOPORT8 (www.ecoport8.eu). One of the brakes which prevents the definition of a common platform is the lack of a well-defined framework. For example, in Italy the dredged sediments are often classified as special waste (with considerable disposal costs), while the proposed limits in other European countries (eg Concerning PCBs, PAHs and heavy metals) more easily allow their reuse, transforming in this way the dregded sediment into a source.

Another important aspect concerns the need for monitoring key environmental matrices. With ECOPORT8, 2 pilot plants were built in the ports of Bar and Burgas, where further measurement campaigns on various parameters, such as the hydrodynamics of the port aquatorium (measures speed and direction of movement of the currents and wind) were carried out. The surveys carried out together with the application of numerical models, can identify the stagnation points and define the movement inside the port with different wind conditions (Figure 3). The objective of the survey is to assess the actions necessary to improve water quality and to deal with emergencies arising from accidental spills.

The scientific work produced by the partnership is finalized to set up an Environmental Improvement Programme for the eco-performance within the port areas, that could foresee the use of instruments, as environmental management system (EMS), environmental risk analysis (ERA), environmental land use plans (LUP) and other eco-instruments for the environmental management of ports of the SEE area.

For more information on ECOPORT8 PROJECT: www.ecoport8.eu

HYDRO PUMPED STORAGE POWERPLANTS: CHALLENGES AND OPPORTUNITIES IN EUROPE

BY PIERRE-LOUIS VIOLLET

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Pumping water up to a reservoir situated at a higher altitude is transforming electricity into potential energy, which can be stored during any period of time. This potential energy can be transformed back into electricity when water passes through the turbines and returns to the altitude from which it had been initially pumped. This is the principle of Pumped Storage Powerplants (PSP), which are in most cases using two lakes or reservoirs situated at different altitudes. PSP is the most widely-used system for electricity storage, and will remain so for a very long period to come.

The first PSP may have been built in 1902 in Ruppoldingen in Switzerland. In 1926, in the French Alps, the steel company Ugine managed to use the lake of Girotte to pump water at moments when the demand for electricity from the steel industry was low, and to turbine water when the electricity demand was higher. In 1933, the hydro plant of Kembs on the Rhein river was built in order to provide the city of Mulhouse with electricity. Two lakes in the vicinity of Mulhouse, Lake Blanc and Lake Noir, with a 100 m altitude difference, were used as a PSP to store electricity from the Kembs power-plant during the off-peak hours of electricity demand [1].

As seen from these historical examples, the initial utility of PSPs was to contribute to a response to the differences in the electricity demand between peak and off-peak hours; in deregulated energy markets these differences are reflected by variations in the price of electricity on the spot market. In Europe, the present development of intermittent renewable sources of energy, such as wind and solar energies, is nowadays increasing drastically the need for energy storage. According to European and national energy policies, inter-mittent renewable sources of energy should provide in 2020 16% of the electricity in Europe, and 26% in the case of Germany. Wind and solar energy can only provide electricity when the resource is available, and not when the electricity demand is high, typically in the morning and the evening of weekdays, and in winter when the temperature is low (in northern

countries for heating), or in summer when it is hot (in southern countries for air cooling). In northern Europe, an anticyclonic situation in winter with low temperatures and no wind over a large area will therefore be a difficult situation. This is why there is an increasing need for energy storage in Europe. PSP is the cheapest solution for energy storage, and has a global efficiency (up to 80%) much higher than other solutions for energy storage like batteries or compressed air storage. A PSP can provide a "black start" to help a power system recover after a black-out. PSPs can also provide so-called ancilliary services to the power system, allowing real-time tuning of frequency and tension of the electricity delivered by the grid, thanks to modulation of the power of the PSP, both in pumping and turbining mode. This is made possible thanks to the development of modern variable-speed pump-turbines [2] [3] [4]. The increasing need for power systems in terms of flexibility and fast variations of the power lead to use pumps and turbines in unsteady regimes, which needs advanced special manufacturing skills and R&D programs, and appears to be an area of competitive advantage to European turbine manufacturers .

The overall installed capacity of PSP is estimated as 140000 MW worldwide, including 46000 MW in Europe. There is today a large development of PSPs in Portugal, Switzerland, and Austria. Germany has a great need for energy storage: there is in Germany today about 6700 MW of installed capacity of PSPs. Considering German national plans for energy, it is considered [5] that the storage capacity should be 100 times greater to face a winter situation with low wind period of 10 days. A major PSP project in Germany is Atdorf (1400 MW) in the Black Forest. A part of the German energy storage need could be covered by neighbouring countries like Switzerland, Austria, and possibly Norway.

In Portugal [6], there is about 5300 MW of large hydropower plants in operation, including 1200 MW of pumping capacity. In 2020, Portugal is expecting to have developed 5800 MW of wind energy, supported by a PSP capacity of about 3200 MW.

France has already a PSP capacity of 4900 MW in the pumping mode, and 4200 MW in the turbining mode, with 6 PSPs in operation. Grand Maison, commissioned in 1985, with 1160 MW in pumping mode and 1790 MW in turbining mode, is the most powerful PSP in Europe [7]. Other French PSPs are undergoing renovation programs.

Austria, Switzerland and Norway have the ambition to become the « green batteries » of Europe, thanks to their large capacities of PSP development, and regulations favourable to PSPs. Switzerland [8] has 11 PSPs in operation, with an overall capacity of 1400 MW. PSPs in construction or under upgrading process will add 2100 MW of new capacity, and other new projects of PSPs could add 1600 MW more. Two major PSPs should be commissioned in 2015 : Nant de Drance (620 MW) by Alpiq on Emosson lake, and Linthal (1000 MW) on the lakes of Limmern and Mutt. Norway has 11 PSPs in operation, with an installed capacity of 1400 MW. Taking advantage of the large natural reservoirs existing in Norway, it is considered feasible to have about 20000 MW of generating capacity from PSPs in Norway by 2030, with new galleries and new pumping/turbining stations between existing lakes, combined with the development of electrical grid interconnexion (DC lines) through the North Sea and offshore wind development in the North Sea [9].

This paper has presented a short survey of pumped-storage development in Europe, but it has to be noted, in conclusion, that other areas in the world having an important program of development of wind and solar energy, like China, have also a very important program of PSP development underway.

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[5] Heil, O., Funke, H.-C., Bruhn, J., Riedel, E., "Energy Storage : Options for more flexibility by large scale storage",SHF PSP conf.
[6] Martins, N., "The Integration of large amounts of renewable energy in the Portuguese Power System", SHF PSP conf.
[7] Ursat, X., Jacquet-Francillon, H.-J., Rafaï, I., "Feedback from experience on French PSP", SHF PSP conf.
[8] Stettler, A., "Pumped Storage Powerplants in Switzerland", SHF PSP conf.
[9] Harby, A., Killingtveit, A., Solvang, E., Sauterleute, A., Belsnes, M., "Opportunity and Challenges for hydro-balancing from Norwegian reservoirs",SHF PSP conf.

The author thanks the organizers and participants of the conference organized by SHF and Tenerrdis in Lyon on November 23-24, 2011 on challenges and opportunites for PSP. This paper could not have been written without the presentations which were delivered at the conference.

SPEAKER OF THE IAHR UK CHAPTER TECHNICAL MEETING

DEVELOPMENTS IN MODELLIN SMOOTHED PARTICLE HYDRO

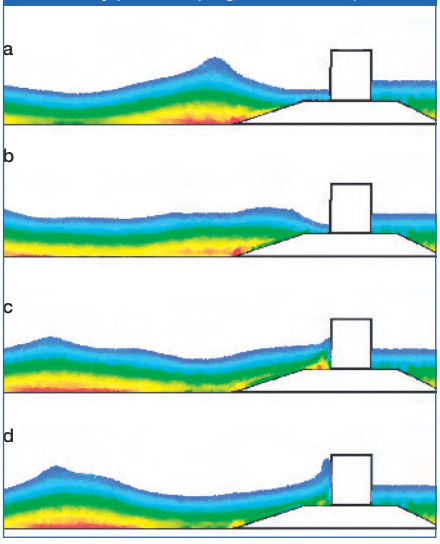
BY BEN ROGERS

Many coastal protection schemes consist of structures with mobile or heavy sections that under certain conditions can be damaged causing movement and further potential damage to the protection structure. The modelling and simulation of the highly nonlinear and potentially violent free-surface motion is an extremely challenging task. Various models have been used over the past few years to model coastal protection, but relatively few have been able to model the situation where parts of the structure are moving where the fluid motion is nonlinear and moving objects may strike or slide on the bed.

SPH model - sphysics

Recently, the numerical method Smoothed Particle Hydrodynamics (SPH) has emerged as a viable computational technique that can capture the highly nonlinear and potentially violent flows that can occur at our coasts (see Dalrymple and Rogers 2006). With this in mind, the SPHysics codes have been developed by a number of researchers around the world to simulate a range of violent free-surface phenomena including wave breaking, dam breaks, greenwater overtopping, landslide generated tsunamis, etc. SPHysics is a free open-source SPH code recently released online (http://www.sphysics.org). SPHysics is a collaboration between four international institutions: The Johns Hopkins University (USA), Universidade de Vigo (Spain), University of Manchester (UK) and University of Rome, La Sapienza (Italy).

Figure 1 Breaking wave approaching caisson breakwater: Breaking has occurred in 2 (b). Maximum run-up shown in 2(d). particles coloured by pressure (Rogers et al. 2010).



With a domain that can be multiply-connected with no special treatment of the free surface, e.g. splash-up, the Lagrangian SPH technique is well suited for identifying formation mechanisms of complicated flow phenomena and studying the performance of engineering structures found in many coastal protection schemes.

The application of SPH to examine moving objects within the coastal zone and in particular where the waves have broken is ideal due to its meshless Lagrangian nature. Incorporating moving objects in SPH is straightforward either with forced or free motion.

Previous work by Rogers et al. (2010) has shown how SPH can be used to model the force and movement of a caisson breakwater. A caisson breakwater is a common coastal protection scheme comprising of large and heavy protective blocks sitting upon some kind of foundation such as a rubble-mound breakwater. Even though, the caisson blocks are heavy and should move very little, there is concern in the coastal engineering community about their behaviour in the uncertain climate of the future. The scenario of the moving caisson on a rubble mound is potentially complex since the sliding caisson may involve elastic-plastic deformations of both, or even failure. At present, engineers possess no reliable means with which to predict the movement of coastal protection structures under wave forcing with all the degrees of freedom. Previously, only Burcharth et al. (2009) present a more comprehensive finite element numerical approach for this problem. Figure 1 shows results from Rogers et al. (2010) with snapshots of the approaching waves. Comparisons with experimental data for the movement and force on the front face in Figure 2 where the rocking motion of the caisson and impact forces are well reproduced by SPH.

Dr. Ben Rogers is an RCUK Senior Research Fellow at the University of Manchester (School of Mechanical, Aerospace and Civil Engineering) He is a founding member of the Smoothed Particle Hydrodynamics European Research Interest Community (SPHERIC), the international organisation representing the development and use of SPH. He is a member of the Steering Committee and runs the website (http://wikiman-chester.ac.uk/spheric). Ben is also a core developer of the open-source SPHysics code (www.sphysics.org) and is the leader of the SPH Expert Group in Manchester.

GPU Computing & DualSPHysics

Recent improvements in computing hardware has created a revolution in scientific computing. Originating from the computer games industry, graphics processing units (GPUs) are designed for processing of large amounts of data in parallel threads. With the appearance of the Compute Unified Device Architecture (CUDA) programming framework from NVIDIA, these devices can now be used for scientific simulations where speedups up to 100 are possible for very large problems. This means that cases requiring expensive high-performance computing (HPC) only a few years ago can now be performed on a desktop at a fraction of the price and energy consumption.

The CPU-GPU code named DualSPHysics has been developed starting from the SPH formu-

G COASTAL PROTECTION USING DYNAMICS (SPH)

Figure 2: Caisson breakwater: comparison between experiment and SPH model (a) time variation of displacement (mm) (b) horizontal force, (Rogers et al. 2010).

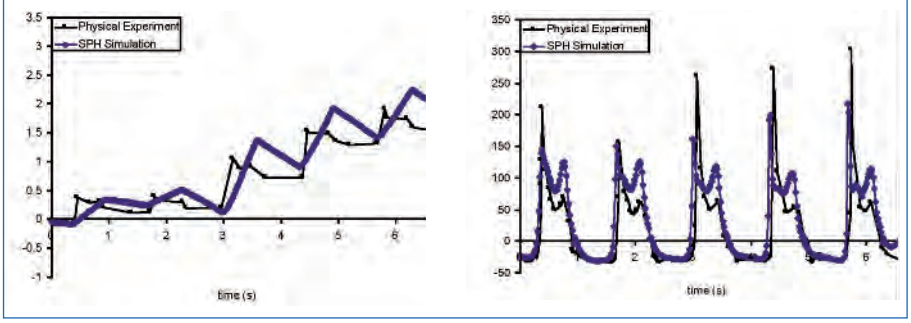
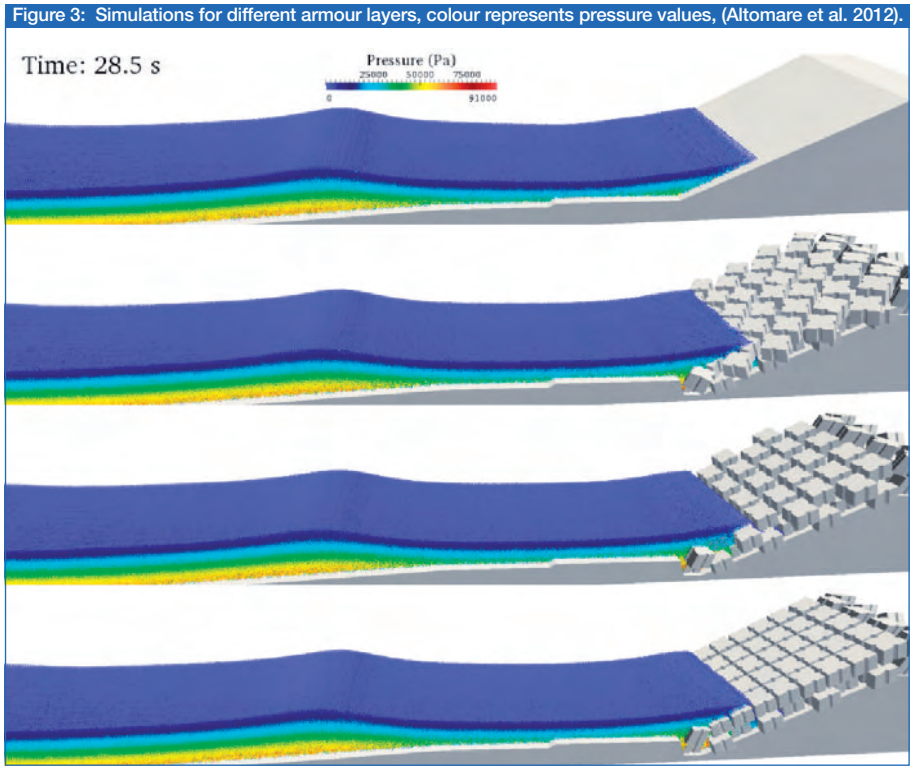


Figure 3: Simulations for different armour layers, colour represents pressure values, (Altomare et al. 2012).



lation implemented in the original SPHysics code (www.sphysics.org). Designed from the outset to apply SPH to real engineering problems with software that can be run on either CPUs or GPUs, DualSPHysics is open source and can be freely downloaded from www.dual.sphysics.org. In Crespo et al. (2011) numerical results were validated with experimental data in order to show how the technique combines the accuracy of the CPU model presented in previous works with the efficiency of GPU programming.

Figure 3 below shows some of the simulations by Altomare et al. (2012) where multiple simulations for breakwater design can now be performed using DualSPHysics. With promising initial results and much more work still to be done, GPUs and DualSPHysics are opening up a new era of modeling our coastal protection structures.

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For information on the open source SPH code visit: http://wiki.manchester.ac.uk/spheric/index.php/SPH_Projects_and_Codes

THE RAINGAIN PROJECT

BY MARIE-CLAIRE TEN VELDHUIS

Investing in Opportunities

This project has received European Regional Development Funding through INTERREG IV B.

INTERREG IVB

Marie-claire ten Veldhuis **works at Delft University of Technology as assistant professor for urban drainage since 2006. She received her PhD degree in 2010 for her research on quantitative urban flood risk analysis based on data analysis of citizens' calls. She is coordinator of the RainGain project and supervises PhD research in the field of urban hydrology and flooding**

Patrick Willems **is RainGain WP2 leader. He is Associate Professor in water engineering at K.U Leuven and Chair of the International Working Group on Urban Rainfall of IWA and IAHR.**

Johan van Assel **is coordinating the model implementations for the RainGain case study of Leuven. He is senior research engineer at Aquafin.**

RainGain project introduction

Localised storms with heavy rainfall can have disruptive consequences in cities for private lives and the urban economy. Accurate information about rainfall and flooding is needed to be able to prevent such damage. This information, however, is very difficult to acquire, especially for cities with their highly variable urban landscapes that cause storms and water flows to move in unpredictable ways. Whether we want to model flooding, explain occurred flood damage or flood complaints, accurate rainfall data are an absolute necessity and precisely this type of data is lacking for urban areas.

That is why the RainGain project was started: to obtain detailed data about peak precipitation and flooding at an urban scale. Rainfall radars will be implemented at four pilot locations: Leuven, London, Paris and Rotterdam, using the latest available technologies. The pilots serve as test sites to demonstrate the capabilities of radar technology for urban rainfall estimation and forecasting. The pilots represent a variety of urban characteristics, where different types of radar technologies will be tested; RainGain thus provides an outstanding platform to test the implementation of rainfall radars in urban areas.

Radar data will be used in detailed urban flood models to simulate and predict urban flooding down to the level of individual households. This information will help water managers in the cities to react adequately to heavy precipitation and to develop effective solutions for improved flood protection, such as warning systems and optimisation of storage capacity. Water managers from the four pilot cities are actively involved in the RainGain project to make sure the developed rainfall and flood data products are made fit for use in water management practice.

The project comprises 13 partners from four countries, Belgium, France, the Netherlands and the UK, including research institutions, meteorological agencies, cities and water management organisations. Their work is centered around the four pilots where innovative radar technologies will be installed for rainfall acquisition and forecasting. Installation of newly acquired state-of-the-art X-band dual polarisation radars is foreseen in the pilots Rotterdam and Paris in autumn 2012. In London and Leuven existing radars will improved to develop better protocols for fine-scale rainfall estimation in urban areas.

Introduction Leuven Case Study

Mid of 2007, the Flemish water company Aquafin in cooperation with the University of Leuven (KU Leuven) installed a short range high resolution X-band weather radar in the city centre of Leuven (Belgium) (Figs.1 & 2). The radar observations cover the entire area of the city of Leuven, which is the capital of the Province of Flemish Brabant in Belgium.

Water management aspects larger Leuven drainage area

The larger Leuven drainage area, as is the case for many cities in NW Europe, suffers from frequent sewer pressurizations and occasional

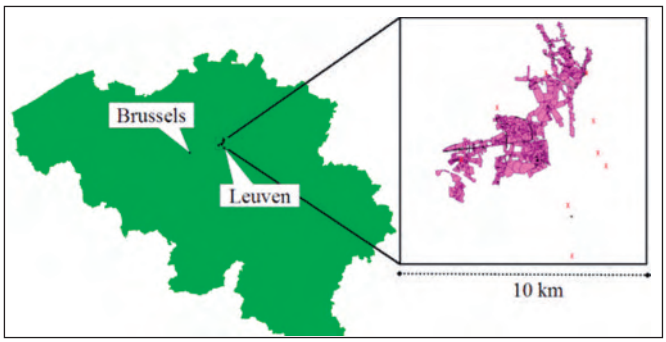

Fig. 1: Location of the city of Leuven, east of Brussels, in Belgium, and the sewer network and rain gauges installed in and around the communities of Winksele, Herent and Wijgmaal, north-western part of the larger Leuven drainage area.

Fig. 2: Location of the Leuven X-band radar of Aquafin, on the roof of the Provinciehuis building.

floods. Due to ongoing urbanization trends and climate change it is expected that the frequency of sewer floods will significantly increase in the future (www.iwawaterwiki.org/xwiki/bin/view/Articles/ICCREUDS). Aquafin is one of the water authorities/companies involved in the project. As a sole wastewater utility in Flanders (6,100,000 inhabitants), Aquafin operates about 230 wastewater treatment plants and almost 1,000 pumping stations. In search for an optimum flood management and control strategy, Aquafin prospects several modelling and monitoring possibilities. Tailored action plans are being drawn up, and a cost-benefit analysis of several static and dynamic adaptation and remediation measures is undertaken. This includes the use of Real Time Control (RTC) strategies and the set-up of a nowcasting system, which requires accurate fine-scale rainfall estimates and short-term forecasts using local radar technology. This RAINGAIN project will contribute to this need.

Experimental site

The experimental site that will be considered for the RAINGAIN project by Aquafin in cooperation with KU Leuven is the sewer network of the communities of Winksele, Herent and Wijgmaal, situated in the north-western part of the larger Leuven drainage area (Fig.1). The total catchment area of this network is about 9.13 km^2 and counts approximately 16,100 inhabitants. An existing sewer network model has been developed for that region by Aquafin. It contains several combined sewer overflow structures (CSOs) discharging on surface waters, of which four are permanently monitored since 2007. Along with this, flows and water depths are measured in a couple of other points in the sewer system, and rainfall is measured (at 2 mins interval) at four locations. Six more rain gauges (10 mins recording) from the Flemish Environment Agency (VMM) are available in this area, and four more rain gauges will be installed by Aquafin within the scope of the RAINGAIN project.

Leuven is approximately located at equal distance from the operational C-band radars at Wideumont (Royal Meteorological Institute of Belgium: RMI) and Avesnois (Météo-France). It is worth noting out that the Avesnois radar was installed under an Interreg project ("Radar du Nord") lead by Météo-France. Other partners were the Walloon region of Belgium, RMI, and different local authorities in the North of France. Moreover, it is very near to the operational C-band radar from Belgocontrol at Zaventem (Brussels Airport). An additional new Dual Polarization radar will be operational from spring 2012 near the Belgian coast at Jabbeke (Fig.3). In the RAINGAIN project, these different rainfall sources will be combined and integrated with Numerical Weather Prediction of RMI for the purpose of fine-scale rainfall nowcasting. The short-term rainfall forecasts can be used as input in the urban drainage system model of the study case to simulate 2D sewer inundations, in support of sewer flood forecasting, warning and RTC. Improved fine-scale rainfall estimates also will increase the accuracy of the urban drainage simulation models, hence increase the accuracy of these models as decision support tools.

National Observer Groups have been set up in each of the partner countries to disseminate project information and receive input from local organisations. More details of project activities can be found on the website www.raingain.eu. If the information in this article has triggered you to become more closely involved in RainGain, you are cordially invited attend one of the annual National Observer Group meetings in Belgium, France, the Netherlands or the UK or one of the international project events

Some technical specifications of the Leuven radar

The Leuven radar is a City Local Area Weather Radar (City-LAWR). It is a radar system based on naval navigation equipment, developed and distributed by DHI Water & Environment (Denmark). The antenna emits electromagnetic waves with a frequency of around 9410 MHz – this corresponds to a wavelength of approximately 3.2 cm – so the radar operates within the X-band. Its peak output power is 4 kW. Despite this low output power, no broadcasting licence would be delivered by the authorities without the guarantee that no waves would be emitted in the direction of Brussels Airport, out of precaution of interference with a ground communication system. After all, Brussels Airport is located only 15 km west of the catchment. The antenna has a width of only 55 cm, protected by a plastic cover (the radome with a diameter of 64 cm) and a weight of 8 kg. This limited size and weight make the system easy to install, and offers more flexibility in selecting a suitable installation site.

The Leuven City-LAWR is capable of delivering data with a spatial resolution of 125 m x 125 m. This high resolution implies less spatial averaging of the errors. On the other hand, the antenna rotates at 24 rounds per minute, taking a full 360-degree scan with each rotation. Each radar image, delivered every minute, is calculated as the average of those 24 scans. The vertical opening angle is 10 degrees up and down when pointing horizontally.

Finding the appropriate location was a critical step in the installation of the system, especially in the urban environment of the region. To find a suitable installation site for the City-LAWR, an empirical approach based on on-site clutter tests was used. In these tests a Micro radar (DHI) was used to carry out test experiments at each site of interest. This was done during dry weather conditions, since during such periods all received echoes can be assumed to originate from ground targets, such as buildings, roads and hill slopes. The resulting images are then used to assess the expected amount of clutter to be expected when the City-LAWR would be installed on the specific site. The procedure is described in detail by Goormans et al. (2008), as well as the results from the candidate sites. From those results, it was decided to install the radar on the rooftop of the "Provinciehuis"-building – the office building of the provincial government of Flemish Brabant –, 48 m above ground level (Fig.2). The system is provided with a broadband connection, which enables remote control and facilitates data retrieval. The system performs various pre-correction steps to the data before storing it locally, such as attenuation correction, volume correction and clutter subtraction.

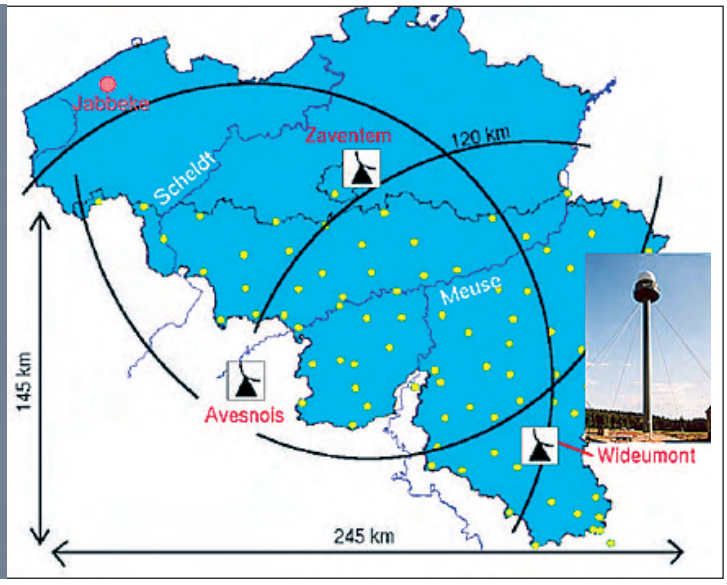

Fig. 3: Location of the SP C-band radars at Wideumont and Zaventem and the DP C-band radar at Jabbeke

WHO IS WHO IN THE EUROPE DIVISION

NEWLY ELECTED 2012-2013 EUROPE DIVISION LEADERSHIP TEAM

Chair
Prof. Aronne Armanini
Universita degli Studi di Trento
Department of Civil and Environmental Engineering
Italy

Vice-Chair
Prof. Dr. Anton Schleiss
Laboratoire de constructions hydrauliques
Switzerland

Secretary
Prof. Corrado Gisonni
2nd University of Naples
Dept. Civil Engineering
Italy

Committee:

Dr. Paul Samuels
HR Wallingford Water Management Department
Wallingford, UK

Prof. Manuel Gómez
UPC-EHMA
Spain

Dr. Bettina Bockelmann-Evans
Dipl-Ing PhD CEng MICE,
Senior Lecturer Hydro-environmental Research Centre
Cardiff School of Engineering
Cardiff University
Wales, UK

Prof. Francisco Taveira Pinto
IHRH/FEUP
Portugal
Co-opted Member

Dr. Mark Rieder
Director
T.G.Masaryk Water Research Institute., p.r.i.
Czech Republic
Co-opted Member

Dr. Eng. Benjamin J. Dewals
Associate Professor, University of Liege
Department ArGEnCo, HECE - Hydraulics in Environmental and Civil Engineering
Belgium

Prof. Peter Rutschmann
Technische Universität München
Department of Civil Engineering
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Assoc. Prof. Dr.
Mehmet Ali Kokpinar
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Techical Research and Quality Control Department
Hydraulics Laboratory, Ankara
Turkey

Prof. Pierre Louis Viollet
EDF R&D FNS CALES BO
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Prof. Pawel M. Rowinski
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Institute of Geophysics
Polish Academy of Sciences
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Elpida Kolokytha
Aristotle University of Thessaloniki
Dept. of Civil Engineering
Div. of Hydraulics & Environmental Engineering
Greece

Klimovich Vitaly Ivanovich
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Department of Civil and Environmental Engineering
Institute of Hydraulic Engineering
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Univ. Prof. Dr.-Ing.
Markus Aufleger
Universität Innsbruck,
Wasserbau
Austria

Support

Estibaliz Serrano
IPD Division Programme Officer
IAHR Publications Manager

CONFERENCE REPORT

BY HUBERT CHANSON

The 34th IAHR World Congress together with the 33rd National Hydrology and Water Resources Symposium and the 10th National Conference on Hydraulics in Water Engineering were held in Brisbane in June 2011. Some recent natural disasters including the 2010-11 floods in Australia and the 11 March 2011 earthquake and tsunami in Japan, and the 2011 floods in North-America showed the complex interactions between nature and society, highlighting that careful management and innovative solutions are required to balance these interactions and solutions must be able to deal with the uncertainty in the natural world as well as our changing human world.

The Congress theme "Balance and Uncertainty: Water in a Changing World" reflected upon the central roles of hydraulic engineering, hydrology and water resources in our changing world, and how these roles link to the broader issues, including the environment, the economy, tourism, social and indigenous values, health aspects, aesthetics and the needs of current and future generations.

The event jointly organised by Engineers Australia and IAHR attracted over 820 participants from 45 countries, among which the student participation accounted for nearly one fourth, and while the IAHR participation was 222 members. The congress proceedings papers were peer-reviewed thoroughly and independently under the leadership of the scientific committee. A total of 587 papers were published in the proceedings [1] out of 840 full paper submissions and 1,400 abstract submissions. The technical program regrouped 6 plenary lectures, 527 oral presentations divided

Hubert Chanson **is a Professor in Civil Engineering, Hydraulic Engineering and Applied Fluid Mechanics, at the University of Queeensland, Australia and was Chair of the Executive Steering Committee.**
His research interests include design of hydraulic structures, experimental investigations of two-phase flows, coastal hydrodynamics, water quality modelling, environmental management and natural resources. He is the 13th Arthur Ippen Award Winner.

Fig. 1 - Opening of the congress by Her Excellency Ms Penelope Wensley AC, Governor of Queensland on Monday 27 June 2011

Fig. 2 - Water engineering games during the congress dinner

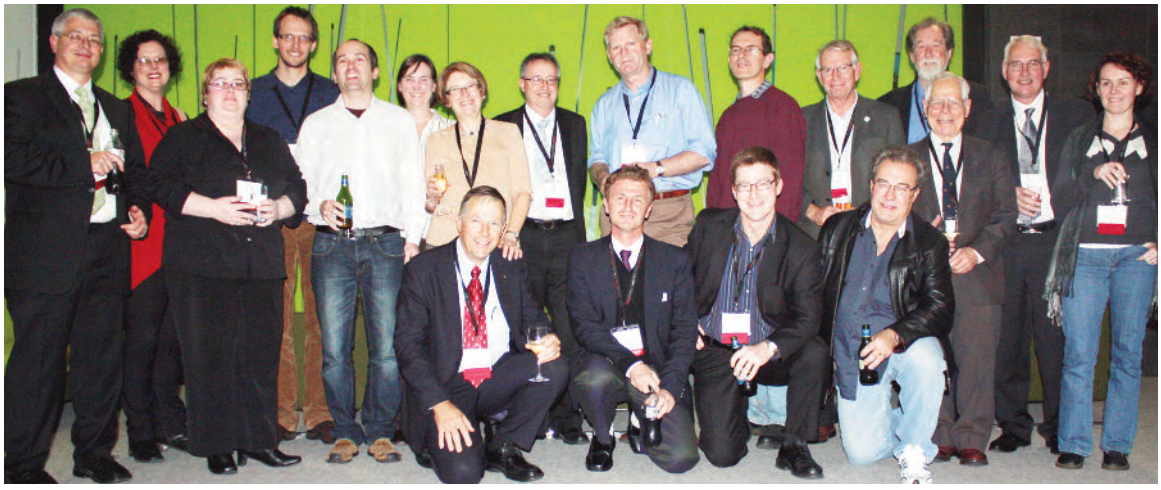


Fig. 3 - Congress Organisation team members: Front row (from left to right): John Macintosh, Hubert Chanson, Toby McGrath, James Ball; Back row (from left to right): Martin Lambert, Ruth McGrath, Trinity Graham, Stefan Felder, Anthony Gaffney, Catriona McAuliffe, Rosemary Macintosh, Rob Ayre, Robert Ettema, Evan Caswell, Bruce Melville, Ron Cox, Colin Apelt, Eric Valentine, Suzan Burow

into 8 parallel sessions and 60 poster presentations with a dedicated poster session on Tuesday evening.
Some highlights of the congress included the opening speech by the Governor of Queensland [2] (Fig. 1), the scientific program of high quality prepared with the highest standards, and the level of professional engagement. Further highlights comprised the social program encompassing the welcome reception at the Queensland maritime museum, the congress dinner featuring the water engineering games (Fig. 2) and a well-organised accompanying persons program, the strong students and young professionals program including the JF Kennedy Student Paper competition, and the in-congress technical tours and technical workshops on Wednesday afternoon.

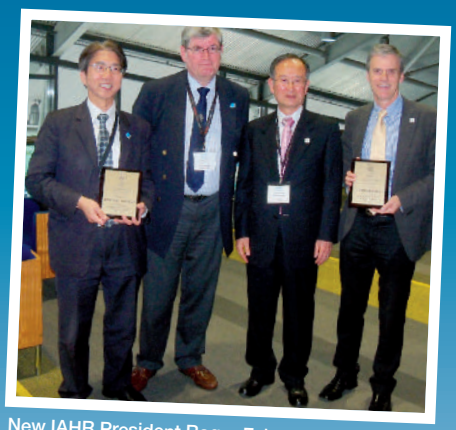
On the behalf of the Congress Organisation, I would like to thank all the congress participants, including the 222 IAHR members, all the reviewers of papers and the associate editors, without whom this congress could not have been a huge success. Lastly I want to thank personally the congress organisation team members (Fig. 3) for their dedication and tireless support during the five years leading to the Congress.

References

[1] Valentine, E., Apelt, C.J., Ball, J.E., Chanson, H., Cox, R., Ettema, R., Kuczera, G., Lambert, M., Melville, B., and Sargison, J. (2011). "Balance and Uncertainty: Water in a Changing World." Engineers Australia Publication, Proceedings of the 34th IAHR World Congress, 33rd Hydrology and Water Resources Symposium and 10th Conference on Hydraulics in Water Engineering, 26 June-1 July, Brisbane, Australia, 4576 pages (ISBN 978-0-85825-868-6).
[2] Opening speech by Her Excellency Ms Penelope Wensley AC, Governor of Queensland on 27 June 2011 {http://www.govhouse.qld.gov.au/the_governor/110627_engineersaust_spch.aspx}

OTHER **HIGHLIGHTS** FROM THE CONFERENCE

Meeting of the Directors of Water Resarch Centres chaired by Luis Balairon, Director of Hydraulics Laboratory CEH-CEDEX, Spain



New IAHR President Roger Falconer with outgoing President, Nobuyuki Tamai and outgoing Vice-Presidents, Peter Goodwin and Joseph Lee

Young Researchers meeting with Sharon Nunes, IAHR Keynote Speaker and IBM Vice-President.

Suzanne Kennedy giving the prize of the John F. Kennedy Student Paper Competition to Fereshteh Bagherimiyab

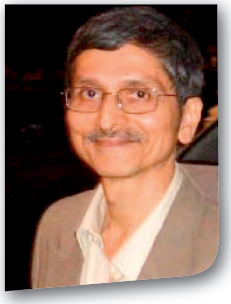
Interested in hosting the IAHR 2017 World Congress?
IAHR Members are cordially invited to submit expressions of interest to host the 37th IAHR World Congress which will be held in 2017. Expressions of Interest should be submitted to the IAHR Secretariat by December 31st 2012, and prospective applicants are strongly recommended to contact IAHR Executive Director, Dr Christopher George, for an informal discussion as a first step. The IAHR Council will select the Congress venue at its meeting in September 2013. The forthcoming Congresses will be in Chengdu, China in 2013 and in The Hague, The Netherlands in 2015.

PEOPLE & PLACES

Jochen Aberle has moved to the Department of Hydraulic and Environmental Engineering at the Norwegian University of Science and Technology, NTNU, Norway. His new e.mail address is jochen.aberle@ntnu.no

Dr.-Ing. Jochen Aberle
Department of Hydraulic and Environmental Engineering
Norwegian University of Science and Technology, NTNUS.P. Andersens Vei 57491
Trondheim, Norway

New director of the Verrmata Jijabal Technical Institute



Prof M.C. Deo, director of the Verrmata Jijabal Technical Institute has been appointed director of the President of Indian Society for Hydraulics for four years. Prof. Deo was president of the Indian Society for Hydraulics for four years, until 2009

For more information
http://www.vjti.ac.in/news_mcdeo.asp

New IAHR Institute Member: Institute of Water Modelling, Bangladesh

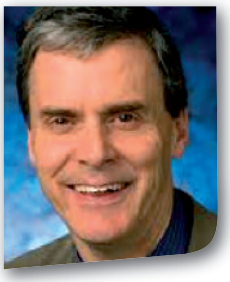
The Institute of Water Modelling (IWM) provides world–class services in the field of Water Modelling, Computational Hydraulics & Allied Sciences for improved integrated Water Resources Management. The application of IWM modelling tools cover a wide range of water related areas such as: flood control, flood forecasting, irrigation and drainage, river morphology, salinity and sediment transport, coastal hydraulics, port, coast and estuary management, environmental impact assessment, bridge hydraulics and related infrastructure

For more information: http://www.iwmbd.org/

INSTITUTE OF WATER MODELLING

IWM

Peter Goodwin appointed Lead Scientist of the California Delta Stewardship Council



Peter Goodwin, former Vice President of IAHR, is an internationally-recognized expert in ecohydraulics, ecosystem restoration, and enhancement of river, wetland and estuarine systems. Goodwin is the DeVlieg Presidential Professor in Ecohydraulics and professor of civil engineering at the University of Idaho. He also is the founding and current director of the Center for Ecohydraulics Research and a former CALFED Independent Science Board member.

Science News (SN) recently met with Goodwin for a Q&A, from which we extracted the following:

SN: How will your experience and background in ecohydraulics influence the direction the Science Program will take as it addresses key Delta issues?

PG: I am not sure that it will influence the direction of the Science Program – but hopefully it will provide a bridge between the science and the implementation of the Delta Plan.

The International Association for Hydro-Environment Engineering and Research created the field of Ecohydraulics in the early 1980s with a very simple objective – engage traditional hydraulic or water resources engineers with aquatic biologists, ecologists, planners and other disciplines to improve our understanding and ability to manage aquatic ecosystems. IAHR has developed a global network of experience and researchers active in the field, and we can exchange experiences with other similar programs around the world and facilitate interactions between students, agencies and researchers.

SN: What key issues do you see ahead as challenges for the Science Program to address?

PG: The Delta is a highly complex and heavily manipulated system. Restoration to some natural historical condition is simply not an option due to the massive changes that have occurred and many of these processes are irreversible and are compounded by climate change impacts and sea level rise. The challenge will be to clearly articulate the future target physical condition and the processes that will sustain the ecological functions of the Delta while addressing water reliability. This desired target condition may not be static but a dynamic target that allows for the adaptation of the ecological resources.

Another key challenge will be the identification and testing of robust performance measures with a strong signal-to-noise ratio that are capable of detecting trends in a reasonable time-frame.

The National Research Council report ("Sustainable Water and Environmental Management in the California Bay-Delta") released on March 29, 2012, provides a comprehensive and concise summary of the major scientific challenges facing the Delta and we will be using this as a guide as we set priorities.

For more information http://deltacouncil.ca.gov/science-program

PEOPLE & PLACES

Marcelo García awarded with the Hunter Rouse Hydraulic Engineering Award

Marcelo García, the Chester & Helen Siess Endowed Professor in Civil & Environmental Engineering and former JHR Editor, has been selected by the ASCE Environmental Water Resources Institute to receive the 2012 Hunter Rouse Hydraulic Engineering Award. García was cited, "For outstanding contributions to the field of hydraulic engineering over 25 years, including research, teaching and service." The committee took particular note of García's many publications and leadership in numerous meetings, workshops and seminars.

García, who directs the Ven Te Chow Hydrosystems Laboratory at Illinois, is a leader in the field of river mechanics, sediment transport, sedimentation engineering and environmental hydraulics. He is best known for his research in sediment entrainment from riverbeds, flow and transport in vegetated channels, the mechanics of oceanic turbidity currents, and the dynamics of mudflows in mountain areas. His research has been funded at the Federal level by the National Science Foundation, the Office of Naval Research, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, and the U.S. Army Corps of Engineers.

He has been recently visiting the Panamal Canal where he gave a lecture about the Chicago Canal.

The award will be presented during the Hydraulic Measurement and Experimental Methods Conference, August. 14th in Utah, USA.

A sad moment

It is regretful to inform that Emeritus Professor Yoshimi Goda passed away on 19th January, 2012. He was a Professor at Yokohama National University from 1988 to 2000, and worked at ECHO Corporation up to now.

For more information, go to www.iahr.org

With regret we have to inform that on 27 February 2012 prof. Eco Bijker died. Eco Bijker was professor in Coastal Engineering from 1968 to 1989 at the Delft University of Technology. Before that he worked for Delft Hydraulics. He was many years a member of the Coastal Engineering Council of ASCE.

For more information, go to www.iahr.org

LETTERS TO THE EDITOR

With this issue of Hydrolink we start with the new column of "Letters to the editor". The Editor of Hydrolink welcomes letters on any subject but reserves the right to condense and edit them. All letters should be less than 150 words, and must include the name, mailing address and daytime phone number of the writer.

Please, address your letters/e-mail to publications@iahr.org.

Michele Mossa, Editor

"PERSPECTIVE OF A JHR AUTHOR

I am writing as I think you will like to have the perspective of a JHR author:

Taylor & Francis is just phenomenal in the way in which they set up and process the final version of the papers in the JHR - very, very professional. It is really a pleasure to go through the process with them.

When I recently requested they send me a 2nd proof of my paper (where actually the mistakes that needed to be corrected were my fault) they cheerfully sent it to me, corrected, and in the end even sent a thank you e-mail. Zero mistakes in my paper - all perfectly and very quickly done!

I must say that this is a big contrast to some other journals I will not mention by name - and which from an author's perspective, gives the JHR quite a competitive edge.

Ana Maria da Silva
Queen's University, Kingston, Canada"

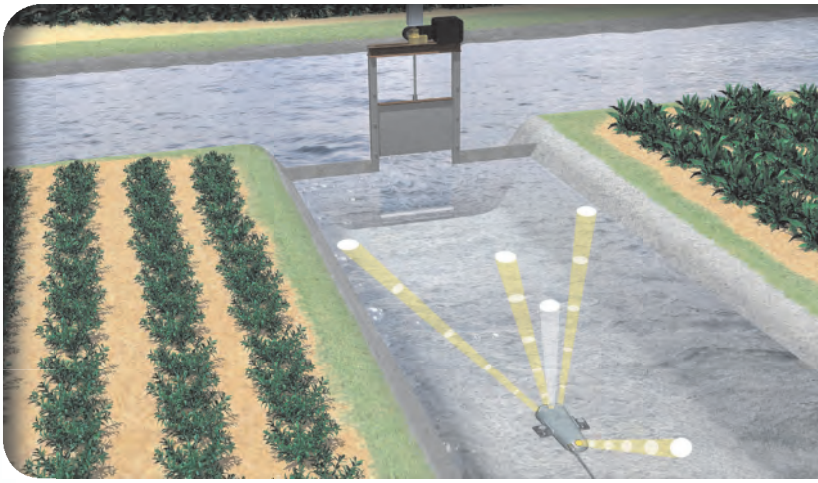
SonTek

a xylem brand

IQ™

Pronunciation: /ˌī-ˈky{uuml}/
Function: n
Definition: [i - intelligent q - flow]

a: term used to express the superior intelligence in an acoustic Doppler measurement device;
b: a score on a standardized intelligence test determined by extraordinary data collection capabilities relative to the average performance of other flow meters.



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