



## ORGANIZING WATER EDUCATION REGIONALLY: THE INNOVATIONS, EXPERIENCES AND CHALLENGES OF THREE SOUTHERN WATER NETWORKS

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### Abstract

The paper presents and contrasts the experiences and challenges of three Regional Water Education Networks in Integrated Water Resources Management (IWRM) - WaterNet (Southern and Eastern Africa), Crossing Boundaries (South Asia) and Concertación (Andes, Latin America). These continental water networks emerged in the new millennium primarily out of dissatisfaction with traditional North-South development and scientific cooperation. Rather than concentrating on centres of excellence that provide universal one-size-fits-all-models, these regional networks of knowledge centres set out to develop a contextual knowledge base on water resources management and build capacity in accordance with regional training needs. These collaborative partnerships have now gained experience in training a new generation of water professionals, who have learnt to appreciate the regional diversity in water problems and design relevant solutions for their regions, often in cooperation with local stakeholders. In this paper, we document and discuss the experiences of these regional networks, focusing especially on the networks' different approaches to 1) interdisciplinary and gender approaches, 2) the connection between capacity development, research and policy advocacy.

### 1. Introduction

In the wake of a growing demand for regionally relevant knowledge and expertise on Integrated Water Resources Management (IWRM), three Southern-based water education networks emerged in the last decade: **WaterNet (Southern and Eastern Africa)**, **Crossing Boundaries (South Asia)** and **Concertación (Andes, Latin America)**. The three regional knowledge partnerships offer an interesting range of experiences.

The **Crossing Boundaries** initiative is built on regional cooperation between researchers and educators from four different countries with common professional interests on the issue of integrated water

resources management and gender. The programme has established a masters programme in IWRM in all four countries in core water resources education establishments (universities and engineering colleges). To ensure that the supporting research activities are relevant, they are explicitly linked to, and co-funded by on-going development projects. The experience shows that with limited funds are not deterrents for achieving large impacts and that critical water issues can be addressed through planned capacity building programmes in the South Asian context.

The **Concertación** experience has developed a methodology that starts from the selection of knowledge themes. Special knowledge teams are formed around these themes and they formulate knowledge projects. A knowledge project consists of three steps: action research, capacity building and advocacy. Action research is carried out by promising scholars who receive fellowships for a period of five months. Knowledge projects can be academic, policy-related and practical, targeting different audiences.

**WaterNet's** major achievement is that it has managed to create a new research culture among the academic staff of its member institutes. This has resulted in more local knowledge being produced, published and disseminated, being debated, commented, absorbed and built on and finally being fed back into the university curricula. This is also a major prerequisite for developing policies that support sustainable development. A comparison of the three networks is compiled below:

#### A provisional comparison of three regional capacity building networks in IWRM

Collaborative partnerships in IWRM	Features of partnerships	Relative strengths
<b>Crossing Boundaries (South Asia)</b>	<ul style="list-style-type: none"> <li>regional network of universities and NGOs</li> <li>since 2005</li> <li>working at different levels: national and regional MScs and PhDs</li> </ul>	<ul style="list-style-type: none"> <li>capacity building in gender and water in the context of IWRM with a special focus on creating cadre of women water professionals</li> <li>knowledge developed in the concrete context of water problems</li> <li>social learning focused research embedded in society</li> <li>research programme linked to existing regional projects</li> </ul>
<b>Concertación (Andes, South America)</b>	<ul style="list-style-type: none"> <li>network of universities, NGOs, water professional platforms</li> <li>since 2006</li> <li>interdisciplinary and problem-oriented research</li> <li>focus on water and livelihood security of marginal groups</li> </ul>	<ul style="list-style-type: none"> <li>connecting capacity building, action research, networking and policy advocacy through knowledge teams</li> <li>studying regional responses to global policies affecting water security</li> <li>different target populations for knowledge products</li> </ul>
<b>WaterNet (Southern and Eastern Africa)</b>	<ul style="list-style-type: none"> <li>regional network of universities</li> <li>since 2000</li> <li>exposing students to regional perspectives and experiences</li> <li>combination of MSc training and thesis research</li> </ul>	<ul style="list-style-type: none"> <li>learning society that frames its own societal problems</li> <li>focussed on smaller research groups that combine comparative strengths</li> <li>established links with regional water networks (GWP), regional funding agencies and governmental communities (SADC)</li> </ul>

Together, these capacity building networks intend to create a paradigm shift in water resources management policy and practice towards IWRM. Although IWRM may mean different things to different people, all the three networks agreed upon the following with the perspectives of capacity building and education:

1. **Regional Integration:** Strengthening regional (and inter-regional) water education in the South.
2. **Interdisciplinary orientation:** Integrating natural-technical and social sciences in teaching and research that is grounded in concrete water problems.
3. **Gendered Approach:** The incorporation of gender and empowerment issues in current curricula for new water professionals.
4. **Linking capacity building** with ongoing research programmes, relevant societal developments and policy advocacy. A significant theme for all three continents in this respect is that of the understanding of water rights within contexts of local water management, unequal power structures and formalisation policies.
5. **Demand-responsive research** requires a conscious effort and carefully designed project modalities in which the researcher engages with the researched population around concrete and real-life problems. This type of research generates a co-learning impact.

After some years of existence, the three networks have now gained quite some experience in training a new generation of water professionals, who in turn have learnt to appreciate the regional diversity in water problems and design relevant solutions for their regions, often in cooperation with local stakeholders. To take stock of these achievements, we organised a creative dialogue among them through a series of inter-continental encounters. Through this dialogue, members of the networks shared valuable experiences and key lessons, both in terms of how to educate water professionals who will be able to deal with effective ways to understand and confront such water problems.

This paper presents and discusses some of the outcomes of this dialogue, on the basis of the interactions and the papers that were developed as part of it. Discussions started with the 'Knowledge on the Move' Conference held in February, 2008 (Van der Zaag et al., 2009) and continued at the Fifth World Water Forum in Istanbul, Theme 6: 'Education, Knowledge and Capacity Development' in March, 2009 (Prakash et al., 2009). The networks interacted and discussed the issues addressed here; most extensively at the international WaterNet conference of November, 2009 in Entebbe, Africa. The paper revolves around the central question - What can we learn from the experiences, achievements, mistakes and ambitions of three regional water networks with regard to the sharing of knowledge, building of capacity, construction of networks and influencing of national, regional and international water resources management policy?

The paper consists of five sections. Section one presents the programmes and activities of the three networks to understand the way they have operated. Section two looks into the issue of interdisciplinarity, while section three dwells on gender concerns. Section four looks into the issue of capacity building and policy advocacy from the perspective of three networks and suggests a way forward. In section 5, we present the conclusions of the paper.

## 2. Sharing knowledge: regional water education networks

### 2.1 WaterNet: capacity building in IWRM in Southern Africa

WaterNet in Southern Africa was established with the aim to be a more inclusive regional network as compared to those resulting from the 'centres of excellence' approach. This approach consists of identifying leading research centres, investing heavily in them, and connecting them to similar centres elsewhere. Although this approach is favoured by the Inter Academy Council (IAC, 2004: 5), there is a potential pitfall: as it singles out the strongest research groups, it may foster exclusivity and marginalize small research groups which on their own would not be able to achieve a critical mass, but if connected could make meaningful contributions.

WaterNet was established in 2000, with the precise aim to strengthen smaller research centers and universities through fostering synergies and collaboration. WaterNet now links some 50 universities and institutions in 14 countries in Southern and Eastern Africa that have a common interest and expertise in water-related issues. Individually they were unable to cover the broad field of water resources management, but by pooling their resources they now cover all aspects, from hydrology to water and sanitation technologies, from environmental engineering to economics and law. WaterNet is therefore in a position to offer a unique regional Masters programme in IWRM, in which the staff of six universities are directly involved, as well as guest lecturers from other WaterNet member institutions (see figure 2). The programme involves 12 months course work and 6 months of thesis research. By 2007 more than 170 students from 15 countries, one third (55) of them women, would be graduated.

Connecting institutions within a region makes sense because water has a transboundary dimension. Connecting universities regionally means that knowledge capacities can be spread and shared, which will contribute to greater equity and will be more cost effective than doing so at national level (Opschoor, 2006). Further, students from different countries sit in the same class and learn the same concepts, enhancing mutual respect and understanding. Moving these students around the region further exposes them to a regional perspective. All this is hoped to encourage future cooperation on water, and thus represents an investment in future peace.

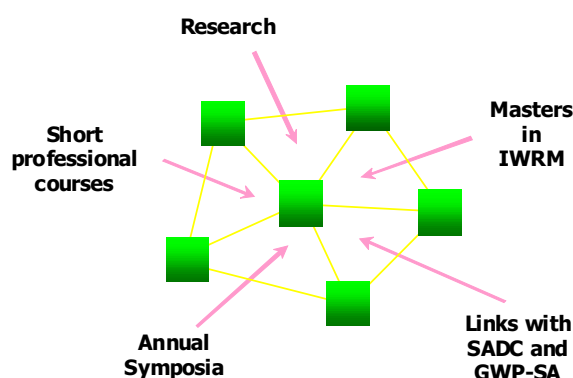


Figure 2. WaterNet and its mutually reinforcing activities

The success of WaterNet lies in the combination of self-reinforcing activities. The modular Masters programme in IWRM allows for a comprehensive set of short professional courses; the research



activities provide thesis research subjects for the students, generates new insights that are fed back into the curriculum, and produces research papers that are presented at annual symposia co-organized by the Water Research Fund of Southern Africa (WARFSA) and the Global Water Partnership – Southern Africa (GWP–SA). These symposia provide a platform where researchers, professionals and policy makers can meet and exchange ideas. For this platform to be effective, it is important that WaterNet is formally recognized by the Southern African Development Community (SADC), and thus by all governments of the member states, and this again strengthens the reputation of WaterNet as a legitimate regional network that offers a credible postgraduate programme.

There are synergies between WaterNet and the WARFSA fund (box 1). WaterNet is also implementing two major research projects in which several institutions and international knowledge partners collaborate: the IWRM for Improved Rural Livelihoods in the Limpopo River basin project of the Challenge Programme on Water for Food (Love et al., 2006), and the Smallholder System Innovations in Integrated Watershed Management project in the Pangani (Tanzania) and Tukhela (South Africa) (Bhatt et al., 2006).

#### Box 1: WaterNet and the WARFSA fund

Because the WaterNet Masters programme in IWRM includes a six-month research project, there are some interesting synergies with the WARFSA fund. WARFSA supports several projects in which WaterNet member institutions and their staff are involved, and provide a good environment for MSc thesis research. This combination of tertiary education and research has proven powerful. Many WaterNet graduates have contributed insights to various aspects of water engineering and management, some of which have been presented at annual WaterNet/WARFSA/GWP–SA symposia and published in special issues of the journal “Physics and Chemistry of the Earth”. This is a growing body of scientific output; by the end of 2007, six special issues of the journal had been published, containing more than 260 papers. This is significant: one out of six papers containing 'water resources' and 'Africa' in their titles, abstracts or keywords published in the period 2002–2007 originated from the WaterNet/WARFSA symposia (Van der Zaag, 2007).

WaterNet represents a first step towards a knowledge community characterized by a strong connectivity between its parts, sharing of resources and distributed access. These elements are the ingredients for a learning society that is able to frame its own societal problems and find new ways of resolving them. The sharing of knowledge among members is clearly a key factor in the success of the network, as is the eagerness of academics to present papers at the symposia. At first many lecturers were reluctant to write papers because there were more urgent issues (i.e. to augment their meagre university salaries with consultancy work), but this has changed rapidly and each year the symposium receives over 200 abstracts. Although university salaries may not have improved much, having an abstract in the conference proceedings, and a paper in an international peer-reviewed journal, is now perceived to be of great value.

## 2.2 Crossing Boundaries: regional capacity building in South Asia

The Crossing Boundaries project is working to build the capacity of water professionals in IWRM through higher education, innovation and social learning focused research which leads to direct impact

on the water sector. The project is being implemented by six partner institutions in Bangladesh, India, Nepal and Sri Lanka and is coordinated by the South Asian Consortium for Interdisciplinary Water Resources Studies (SaciWATERS), based in Hyderabad, India and the Irrigation and Water Engineering group at Wageningen University (Gunawardena et al., 2008).

While new research and innovation in the various water disciplines are important, the notion of 'integration' remains elusive, particularly between natural/technical and social scientific perspectives. Innovative research is therefore needed to enhance the IWRM knowledge base. Such knowledge is best developed in the context of real water resources management problems and efforts at intervention, transformation or reformation towards IWRM. The Crossing Boundaries project is supporting such an innovative programme by providing resources to enrol four research coordinators, 15 PhD and 160 MSc students, as well as for staff and student exchanges, and funds for research and stakeholder meetings. For such a huge research effort, the research agenda was to be carefully designed. During visits to partner organizations, staff of member institutions discussed strategies to link the research programme to existing projects and participated in many meetings with stakeholders. During the research formulation stage four attributes were emphasized: [1] the research should address a current problem in water resources management, [2] employ an interdisciplinary approach, [3] encourage the participation of stakeholders and lead to an impact. The research proposals were all linked to ongoing projects, thus ensuring that the research effort would address real problems.

The interesting aspect of this initiative lies in the fact that it is built on regional cooperation between researchers from four countries, and links the research activities to ongoing development projects. The project focuses on education, research/innovation, knowledge base development and networking, in a combined effort to contribute to a paradigm shift in water resources management in South Asia. This focus on longer duration education input, as opposed to short term training, derives from the fact that shaping attitudes and perceptions and teaching the skills of interdisciplinary and more comprehensive analysis and intervention requires time. The project is implemented by a group of institutions with a proven interest and track record regarding integrated, interdisciplinary and gender-sensitive approaches to water resources management.

### **2.3 Concertación: interdisciplinary research in the Andean countries**

The current distribution of water, expertise and decision-making power over water management in the Andean region can be described as unjust, undemocratic and unsustainable. Concertación is an interdisciplinary research and capacity building project aims to improve the water and livelihood security of peasant and indigenous communities in the Andean region. A collaborative project involving institutions in Bolivia, Ecuador, Peru, and the Netherlands, Concertación will develop and support more democratic, equitable and sustainable water management policies and practices (Rap, 2008).

The urgency of the water security problem in the Andes is well recognized. New policies are needed to respond to the water management challenges, but proposed solutions are usually hotly debated because of the diverging visions, objectives and strategies of different water use sectors and user groups. One issue is the effect of new policies on water access security of Andean communities, especially for farmers, indigenous peoples and other groups that depend on water for their livelihoods. For example, neo-liberal agricultural policies, land & water rights registration and modern water use technologies promote individualizing tendencies that threaten the collective and customary water

rights of these marginalized groups. These tendencies, their impacts and solutions for the water security of these groups for the water security of these groups, however, prove to be very different in the coastal, mountainous and Amazonian regions of the Andean countries. Another theme is that governments are committed to secure the investments of extractive industries in minerals, oil and gas. Yet, it is unknown what the impact of these industries will be on the water and food security of local communities, and to what extent these communities can negotiate.

The Concertación project intends to contribute to the debate over water policies through research, exchange, capacity building, and policy advocacy. This will lead to the development of new responses and proposals by local, regional and national actors, who will participate in the public debate to develop water management strategies and policies that are effective, equitable, democratic and adapted to local contexts. The project strategy is to establish a network of water professionals who will be able to design innovative research and encourage social learning. The project will also create a platform for exchanging knowledge about sustainable and equitable water resource management. The themes of the project are:

- Legal pluralism, water management and recognition policies: the existence and recognition of different normative repertoires in water management;
- Local water management and the strengthening of authorities and organizations: decentralisation requires new capacities for local and regional organizations;
- Integrated water resources management at the watershed level, involving for example inter-sector water allocations, institutional reforms and stakeholder participation;
- Regional and international policies for integrated water management: current water laws and policies on IWRM often stem from the international level and are similar for the Andean region.

Within each of these themes, the research, capacity building and policy advocacy activities focuses on collective water rights, local irrigation systems and the feminization of water management. Around each theme, a knowledge team of water specialists is created, which designs a comparative 'knowledge project' and may call in international expertise. For the field research, fellowships are awarded to researchers and professionals who may have problems obtaining funding or require job training. The action research begins with a baseline study by a regional or international expert, who also ensures the quality of the final products.

Each knowledge project entails three steps. First, the status of the water management problem is assessed through action research. The findings are then translated into capacity building efforts and subsequently into advocacy and networking activities aimed at improving water policy. In this manner, together with national discussion and training platforms, the results of the action research-based studies can be translated into proposals, methodologies and actions to improve water legislation. The knowledge products generated include publications targeted at academics, professionals, policy makers and lay audiences, including practical guides for water users, their leaders and activists. Although basic research is not the project's primary objective, the network partners, the local and national case studies and the policy processes in which they are embedded offer a wealth of data for analysis of water policy and intervention processes.



### 3. Interdisciplinarity

All three networks, albeit in varying degrees, share the ambition to transform the prevailing technocratic approaches in learning, understanding and managing water. They all aim to educate 'a new generation of water professionals' who recognize that most water problems are multi-dimensional and that solving them requires more than just engineering expertise. This ambition is captured with the word 'interdisciplinarity' – which is a term that means many different things to different people. The network's experiences with attempts to broadening the scope of the curriculum of water education, can be seen as attempts to grapple with the question: “How to incorporate social science perspectives into technical engineering courses, research and policies”?

The experiences showed that the ambition to change engineering education has a lot of barriers. The Concertación network has many social scientists, most of whom regularly experience how engineering is viewed as a better and higher form of knowledge than social science. It is, as a consequence, difficult for them, as social scientists, to be taken seriously by natural scientists and engineers and even more difficult for them to contribute to setting the agenda. In general, natural scientists and engineers tend to believe that what they do is more difficult and challenging, and also more 'scientific'. In South Asia, proposed curriculum changes were sometimes resisted and perceived as political moves to provide differential and ideologically inspired learnings rather than the supposedly objective and classic engineering courses. For many, interdisciplinarity means a dilution of the core engineering subjects, which is not acceptable. Another problem was the capacity of the faculty members to teach interdisciplinary subjects when their own training had been disciplinarily oriented. Many are of the opinion that it is easier for engineers to learn and practice social science than the other way round. The experience of the engineers and natural scientists is that social scientists often lack their scientific rigor and exactness. In their view, social science remains a question of speculation or of reasoned opinion. This shows that not just the higher value is often attached to exact or natural sciences, but also that social scientists and engineers maintain different epistemological norms.

During the dialogue in Entebbe, different groups were invited to creatively depict or represent their vision of the future water professionals of 2030. What does the water professional of tomorrow look like? The responses were fascinating and diverse, with different groups making use of interesting metaphors to visualize the future water expert: a two-headed animal-person with each head moving in a different direction; a many-armed and headed Hindu God, an adaptor plug that can be used with different sockets; and a strong tree with many branches, etc. Each of these metaphors in different ways illustrates some of the main questions that an interdisciplinary approach evokes:

1. Is 'real' expertise still needed in the future, or do experts need to become communicators and facilitators whose main task is to help organizing democratic processes of water decision making and making sure that water conflicts are resolved in a fair and transparent manner?
2. How much knowledge does one person need to have? Is it a question of all experts knowing everything or of different experts learning to talk to and understand each other?
3. Do all experts have to become interdisciplinary? Or do we just need some interdisciplinary experts who can help in bridging different forms of knowledge and expertise – and can the rest of us remain disciplinary experts?

Some participants were of the opinion that all experts need to remain strongly rooted in one discipline,

but that they need to become literate in other disciplines as well. Others felt that the real issue was the question of how to communicate science to (and with) a broader audience, not just scientists but also politicians, policymakers and communities of water users. The debate about the boundaries of disciplines and how to cross them also led to a deeper questioning about the boundaries between science and other types of knowledge, leading into a discussion about how to democratize knowledge.

#### 4. Gendered approaches

All three networks recognize that there is a huge gender-gap in water: whereas many of those who use and manage water at the level of individuals and households are women, the people who decide and know about water are predominantly men. This gender-gap in water has two dimensions that are interrelated – although not in direct causal ways: (1) the WHO question: who are trained and educated as water professionals? Who are (recognized as) water experts and who manage and decide about water? (2) the WHAT question: What should be done to incorporate questions of gender (and of power, equity etc) in engineering education?

This session started with a lively debate about the WHO question. Interestingly, each network differently deals with the question of gender balance, with the CB network applying a very strict quota system (87% of all students have to be women) and WaterNet and Concertación adopting a 50% rule, but not always fulfilling it. WaterNet reaches percentages of about 40% of women for their MSc courses. In Concertación, percentages of female participation in the courses were much lower (around 20% max.), but when a quota system was adopted, this has improved. Experience from the Concertación network also showed that there are more women participants when course fees are lower. Both in Concertación as in Crossing Boundaries, one impediment to further increasing the number of female participants in water courses is that most courses only accept students with an engineering background.

Opinions about the pros and cons of a quota system however could not be categorized according to network or region; opinions varied widely irrespective of gender, age, disciplinary background or country of origin. Although all participants agreed that there is a need for improving the gender balance in education, there was quite some disagreements about how to best achieve this. Yet, everyone was impressed with the large numbers of female students within the CB network, which in itself seemed to suggest that some positive discrimination – at least in the initial years – may help to create a gender transformation. At the same time and as some members of the CB network noted, gender is not the only implicit selection criterion. In India and the rest of South Asia, caste and class-based discrimination is also rampant – with the large majority of water experts and managers being members of higher caste groups. Having to say no to very good male candidates was also something some members of the CB network regretted.

About the WHAT question, the three networks exchanged their experiences and ideas. Most of the education and training provided through the networks includes some specific modules about gender, and also some larger social science and communication modules. Some also make explicit attempts to scrutinize and reformulate the other modules in terms of gender and other social biases. The relevance of gender is easiest to demonstrate: (1) at the level of users, which is why gender analysis skills need to be taught alongside other methods and theories that help students understand and communicate with users, such as field visits; (2) as one dimension of larger equity and justice questions crop up in water. Addressing and understanding gender therefore requires a framework that helps identifying and analyzing questions of equity in water. An additional interesting finding was that the introduction of

gender-related themes in education comes more easily as part of a wider transformation towards more interdisciplinarity.

In general, many participants felt that the quality of gender and water expertise that they can draw upon in courses is low. Mostly, gender and water work is very qualitative, dealing with specific cases studies. It lacks the rigor and systematic approach that characterizes good scientific work. Also, gender experts who are invited to teach gender and water courses often know about gender, but not about water. Courses risk therefore becoming very ideological and are not well linked to the overall curriculum.

## 5. Connecting capacity development, research and policy advocacy

The initiative in the three regions is built on regional cooperation among researchers from different countries with common professional interests on the issue of IWRM. To ensure that research activities are relevant, they are explicitly linked to, and co-funded by, on-going development projects. The experience shows that the issue of interdisciplinarity can be addressed through planned capacity building programmes. While new research and innovation in the various water disciplines are important, the notion of 'integration' remains elusive in many new research projects in all the three regions. This is particularly between natural/technical and social scientific perspectives. Innovative research is therefore needed to enhance the IWRM knowledge base. Such knowledge is best developed in the context of real water resources management problems, efforts at intervention, transformation or reforms towards IWRM. In this section, we look at the initiatives in three regions closely to answer the questions - In which way can we link capacity building with ongoing research and policy advocacy in order to increase its relevance and sustainability?

### 5.1 The approaches

WaterNet focussed on participatory planning and research activities. The case represents in having action research results adopted as policy, protocol and practice. Different practitioners worked together on different topics in same area. Research was impact-oriented and feedback of results went into teaching. The case shows iterative teaching and learning process, interdisciplinary approach to supervision and learning, as well as farmer training. Research was practical, with direct implications on practice and implementation. There was an influence on researchers who were also lecturers. The research was largely multi-disciplinary and it helped in bringing researchers that were harvested into teaching, through involvement of an alumni association. However, the WaterNet case, generates some questions relating to capacity building and advocacy such as the case of gender balance in education. It is believed that gender balance requires a direct policy and a firm stance, as well as active recruitment, as opposed to giving members freedom to recruit, especially from within their own staff.

**Concertación's** initiative focussed on the lessons learned within the capacity-building system of the CAMAREN Consortium and the National Water Forum (Foro Nacional de los Recursos Hídricos in Spanish). Both experiences are being developed in the South American country of Ecuador. An emphasis is put on identifying the key aspects of these two experiences, which have allowed, on one hand, the development of an inter-institutional network of knowledge and training, and on the other hand, the fostering of a space for the formulation of proposals and political influence aimed at improving the management of water resources. The case shows action research that was undertaken with involvement of beneficiaries and input from policy makers. The Forum defined the research

agenda, enabled a demand-driven approach and the involvement of academia, institutions, indigenous organizations. There was a legitimisation of policy arguments based upon case study results wherein communities were part of the learning process and problems were jointly owned by researchers and the community in a co-learning framework. Academic institutions have become more practical as part of this process and results of the research lead to policy implications that supported advocacy efforts.

The **Crossing Boundaries project** worked to build the capacity of water professionals in IWRM through higher education, innovation and social learning focused research. The project is being implemented by six partner institutions in Bangladesh, India, Nepal and Sri Lanka, and is coordinated by SaciWATERS. The project focuses on education, research/innovation, knowledge base development and networking, in a combined effort to contribute to a paradigm shift in water resources management in South Asia. This focus on longer duration education input, as opposed to short term training, deriving from the fact that shaping attitudes and perceptions, and teaching the skills of interdisciplinary research and more comprehensive analysis and intervention requires time. The project is implemented by a group of institutions with a proven interest and track record of integrated, interdisciplinary and gender-sensitive approaches to water resources management.

## 5.2 Major Lesson Learned

The value of interdisciplinary teaching and capacity building has developed a sense of appreciation among the faculty and students that most issues relating to water are cross-cutting in nature, involving technical, social, economic, ecological, legal and gender perspectives, and hence needs an integrated approach. This involves knowledge perspectives from different disciplines in the analysis of problems and solutions relating to water resources development and management. This appreciation has encouraged the students and the faculty in conceptualizing research problems and formulating methodology and analytical frameworks to address the problem in an interdisciplinary framework. In doing so, the guiding premise has been that the research results must add value, directly or indirectly, to the community and to the agencies engaged in the development of water resources.

### **Interdisciplinary teaching and capacity building shaping impact oriented research**

The interdisciplinary teaching and capacity building has enabled students to pose research questions in an inter-disciplinary manner which has a societal relevance. Apart from receiving interdisciplinary courses in the classroom, students were provided with additional impetus through various training programmes. Previously, the research questions were more multi-disciplinary than inter-disciplinary in nature. The first set of activities employed during the initial implementation period of the project was to reshape the technically oriented water resources management curriculum of the partner institutions into an interdisciplinary programme through introduction of three new courses, namely Field Research Methodology, IWRM and Gender and Water. The implementation process to incorporate three new courses commenced with the holding of staff trainings to train academic staff and formulate the course capsules. Most of the academic staff has never been exposed to disciplinary areas covered in the staff trainings. These training activities have sensitized them to think beyond technical solutions in addressing water resources management issues. The academic staff, especially the younger group, have very little exposure to societal issues since they have been conducting research in the same disciplinary areas. Continuous exposure to training programmes on societal issues and events which addresses water resources management problems in an interdisciplinary manner has to a certain extent reoriented these technically qualified academic staff to modify the teaching materials of the traditional



engineering courses that they teach.

### **How differently the problem conceptualised?**

All the three programmes have developed research programmes and methodology with the partner institutions that are impact-oriented, societally driven and participatory in approach. Thus, all the partner institutions through their PhD and Masters students have conducted research on themes that address current problems in water resource management in their own selected study areas. The research process is conducted in a participatory manner involving stakeholders as much as possible. The trainings on the various subjects as well as the training on field research methodologies are also geared towards building the capacity of the faculties and students towards successfully conducting such research. As a result the problems were conceptualised differently and as a process that reflected the ground realities of a water management problem.

### **Implications of interdisciplinary education**

The outcomes of the research & capacity building and the results produced are expected to be useful in refining the academic curricula in order to make the curricula more applied and reflecting on the outstanding and emerging problems relating to water resources. The newer knowledge generated through faculty and students' research initiatives will further help in streamlining the teaching agenda in different courses which will enhance the quality of delivery of the courses and understanding by the students. The most important implications with regard to policy advocacy is expected to be an appreciation of importance of alternative perspectives, alongside of technical, economic and financial perspectives, in water resources development and management. The graduates upon completion of the course are expected to pursue these perspectives in the institutions where they will be engaged to work. Apart from providing a wider understanding of water management related problems to the students, the teaching staff is fully involved with the research supervision of students and the findings are incorporated back in the teaching. The students are conducting research with relevant stakeholders and regular meetings are being held with them. The findings from the studies are being used during the training programme of government officials. Since staff and students are working with the relevant government institutions and civil society organizations, most of the findings could find its way to influence policies.

### **Taking the road - less travelled**

The students have been supported by the CB Project to acquire the necessary knowledge and skills required to conduct research through newly introduced courses. In addition, they were given theoretical understanding in water and equity issues and field training in participatory research for a period of two weeks. This also gave them the opportunity to interact with their colleagues from other partner institutions in different countries in the region and learn from one another.

The problem-based interdisciplinary research conducted through stakeholder participation was new to many partner institutions. The traditional practice is to guide the students through their respective supervisors for a specific research project with clear objectives. In this case, academic staff along with the students addresses a common theme from different angles to address a major water management problem identified by the universities. However, apart from the key learning, introducing an interdisciplinary education is not easy in an otherwise rigid university education in all the three regions. In the process, faculty found it difficult to work for an interdisciplinary problematisation of research



when their own training was not interdisciplinary. The content of interdisciplinary teaching has to be grounded in the reality of the sector. Through an initial course in field work, the students get to know the ground reality not only at the intellectual level, but even at the experiential level. The students are encouraged to approach the theory in the light of the real-life situations and problems. This makes students willing and looking for impact-oriented research. If given proper support in terms of specially designed, taught and self-study courses, there is greater chance that the quality of research is higher, not only in academic terms but also in terms of its relevance and utility to the outside stakeholders. At the same time, because of the same factors, the students are less inclined and less capable due to lack of knowledge of literature, lack of awareness of unusual methods and tools for research to non-interdisciplinary research.

To sum up, the issue of interdisciplinary teaching and capacity building in shaping impact oriented research is a road less travelled. It was found that students research problems were more relevant to society and key stakeholders. The research questions then have direct implications for solving the problem. Therefore, the curricula were more applied and reflected the outstanding and emerging problems relating to water resources. The link between research, capacity building and advocacy is well developed. However, the challenge is to transform an interdisciplinary education to a trans-disciplinary one, which is a longer way ahead.

## 6. Conclusions

This paper presented, compared and contrasted the experiences and challenges of three Regional Water Education Networks in Integrated Water Resources Management. These regional networks of knowledge centres built capacity in accordance with regional training needs and developed a contextual knowledge base on water resources management. They have gained experience with training a new generation of water professionals, who learn to appreciate the regional diversity in water problems and design relevant solutions for their regions, often in cooperation with local stakeholders. Through a dialogue, these networks shared valuable experiences and key lessons, both in terms of how to educate water professionals that will be able to deal with water problems of the future.

One key lesson that comes out of all three networks is that water binds people regionally. There is a perceptible pride in collectively achieving the education of a new generation of water professionals who are able to analyze and solve conflictive water problems that concern the region with a shared body of conceptual tools. For example, this means water professionals from different South Asian countries with contentious ties who are in daily life: Buddhists, Muslims, Hindus or Christians, to work together and construct a common professional language to discuss the region's water problems. This is all the more remarkable in a geo political context of political, economic and religious tensions between nations. Besides professional relationships, this creates friendships that extend over the years and over borders. These connections that a regional network sustains create spaces for debate about regional water policy, the challenge of climate change and transboundary water problems that do not exist nationally. Similar examples can be given for Africa and Latin America, where regional water networks survive and intermediate between instable and politically opposed regimes. Such experiences contribute to a strong belief that strengthening regional water education in the South contributes to regional cohesion and integration, which in the end favours regionally peaceful relations. The immaterial benefits, positive impacts and long-term dividend of regional water education are however difficult to measure. Networks therefore experience problems to convince governments and donors to

commit for the long term.

A crucial factor in the sustainability and coherence of these regional networks is a shared Masters Program in IWRM, such as that of WaterNet or Crossing Boundaries. More than the network itself in which WaterNet plays a vanguard role, it is the network program that can continue without the help of the network. Member Universities establish their own Masters Program and some Universities attract their own students. Concertación has acknowledged the need for a similar Masters Program as the sustainable core of a regional cooperation that will enhance not only water education, but also regional water research (Water Justice) and policy advocacy (Andean Water Forum).

The professional identity of water professionals is historically and universally dominated by male engineers. This presents significant challenges to regional water networks in terms of integrating gender perspectives and interdisciplinary approaches to IWRM. The three networks discussed here have made a significant headway in this respect. Changing the gender balance of the profession implies changing dominant and long cherished professional cultures and identities, and this is a process that will take time, patience and stamina – and one that will continue to require concerted affirmative actions and attention. Another interesting feature that these networks share is their intent to connect water education with water research and policy advocacy by involving local stakeholders. The following aspect is worthy of mentioning yet in practice experiences some shortcomings that merit reflection.

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