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STRENGTHENING ENVIRONMENTAL AWARENESS



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Edited by Jürgen Steinbrecher,
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Capacity Development in Water Engineering and Environmental Management

Editors

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Strengthening Environmental Awareness

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PREFACE

CapWEM stands for “Capacity Development in Water Engineering and Environmental Management” and was a joint project of universities from eight countries in Latin America and Europe: Argentina, Brazil, Chile, Costa Rica, El Salvador, Paraguay, Portugal and Germany. The University of Siegen in Germany was responsible for the coordination of the project.

CapWEM's main objective was to improve higher education and enhance competences of professionals in the topics of water and environment in the Latin American partner countries. These targets were achieved by fostering academic cooperation between Latin America and Europe and establishing networks, aiming to create opportunities for sustainable collaboration both inside and outside academia.

Latin American countries are facing enormous challenges in terms of ensuring good water quality, equitable access to clean water and protection against water-related hazards like floods and droughts. Universities play a vital role within the process of meeting these challenges by training the future experts according to the state of the art. In addition universities should provide professionals in practice with recent research results and extend their knowledge. In order to achieve socio-economic benefits, the higher education institutions must be open for collaboration with public authorities and private companies. Finally they should contribute to increase public awareness regarding environmental protection and the proper use of water.

CapWEM organized its activities in different working groups covering the topics of improving Higher Education in undergraduate, graduate and doctorate programs; fostering continuing education for professionals; promoting cooperation between higher education institutions and private/public sector by technology transfer, common work on guidelines/norms and increasing environmental awareness; improving risk management, especially in cross-border watersheds.

CapWEM ran over a period of three and a half years from 2011 until 2014. The main outcomes of the project are published in this series. The project has been funded by the EU programme ALFA of the Directorate-General EuropeAid under the contract number DCI-ALA/19.09.01/10/21526/254922/ALFAIII (2010)55. ALFA stands for "América Latina - Formación Académica" and is a programme to support the institutional cooperation between higher education institutions in the European Union and Latin America.

The intensive collaboration among partners and their effective engagement over a period of more than three years fostered comprehensive results and experiences. Seven project meetings took the CapWEM team to all participating universities in order to consider regional adapted problems and solutions. A huge number of students and professionals could benefit from CapWEM's activities. We expect that the project results will have positive impact on socio-economic development and help to face the challenges in the topics of water and environment in Latin America more efficiently.

The Editors

PRESENTACIÓN

El proyecto "Desarrollo de Capacidades en Ingeniería del Agua y Gestión Ambiental"; conocido por sus siglas en inglés como CapWEM (Capacity Development in Water Engineering and Environmental Management) fue un proyecto conjunto entre universidades de ocho países de América Latina y Europa: Argentina, Brasil, Chile, Costa Rica, El Salvador, Paraguay, Portugal y Alemania. La Universidad de Siegen en Alemania fue responsable de la coordinación del proyecto.

El objetivo principal de CapWEM fue mejorar la educación superior e incrementar las competencias de los profesionales en las temáticas de agua y medio ambiente en los países socios de América Latina. Estas metas se alcanzaron mediante el fomento de la cooperación académica entre América Latina y Europa y el establecimiento de redes, con el objetivo de crear oportunidades de colaboración sostenible, tanto dentro como fuera de la academia.

Países de América Latina enfrentan enormes desafíos en términos de asegurar una buena calidad del agua, el acceso equitativo al agua potable y la protección contra los riesgos relacionados con la ocurrencia de amenazas hidrológicas, principalmente inundaciones y sequías. Las universidades desempeñan un papel vital en el proceso de responder a estos retos mediante la formación de los futuros expertos de acuerdo al estado del arte. Además las universidades deberían proporcionar a los graduados durante el ejercicio de su profesión los resultados de sus recientes investigaciones a fin de permitirles ampliar sus conocimientos. Con el fin de lograr los beneficios socioeconómicos, las instituciones de educación superior deben estar abiertas a establecer vínculos tanto con las instituciones públicas como con las privadas. Finalmente, deben contribuir a aumentar la conciencia pública en materia de protección del medio ambiente y el uso adecuado del agua.

CapWEM organizó sus actividades en diferentes grupos de trabajo cubriendo los siguientes temas: mejora de la educación superior en los programas de pregrado, postgrado y doctorado; fomento de la educación continua para los profesionales; promoción de la cooperación entre las instituciones de educación superior y los sectores público y privado mediante la transferencia de tecnología, el trabajo común sobre directrices y normas y el aumento de la conciencia ambiental; la mejora de la gestión de riesgos, especialmente en las cuencas transfronterizas.

CapWEM se ejecutó durante un período de tres años y medio partir del año 2011 hasta el 2014. Los principales resultados del proyecto se publican en esta serie. El proyecto ha sido financiado por el programa ALFA de la UE de la EuropeAid Dirección General bajo el número de contrato DCI-ALA/19.09.01/10/21526/254922/ALFAIII (2010) 55. ALFA significa "América Latina - Formación Académica" y es un programa de apoyo a la cooperación institucional entre las instituciones de educación superior en la Unión Europea y América Latina.

La intensa colaboración entre los socios y su compromiso efectivo durante un período de más de tres años ha producido resultados y experiencias integrales. Siete reuniones del proyecto llevaron al equipo CapWEM a todas las universidades participantes con el fin de examinar los problemas regionales y ofrecer soluciones adecuadas. Un gran número de estudiantes y profesionales podrían beneficiarse de las actividades de CapWEM. Esperamos que los resultados del proyecto tengan un impacto positivo en el desarrollo socio-económico y contribuyan de manera eficiente a hacer frente a los retos relacionados con el agua y el medio ambiente en América Latina.

Los editores

PREFÁCIO

A sigla do projeto CapWEM significa "Desenvolvimento de Capacidades em Engenharia Hídrica e Gestão Ambiental". O projeto é coordenado pela Universidade de Siegen, da Alemanha, e foi fruto do trabalho conjunto das universidades de oito países da América Latina e Europa: Argentina, Brasil, Chile, Costa Rica, El Salvador, Paraguai, Portugal e Alemanha.

O objetivo central do projeto foi a ampliação de competências profissionais na área temática da água e do meio ambiente nos países parceiros da América Latina. Esse objetivo foi alcançado por meio de intensa cooperação entre os parceiros e a criação de redes, tanto na América Latina como entre América Latina e Europa.

A justificativa do projeto baseia-se nos enormes desafios que muitos países latino-americanos enfrentam em relação à garantia de adequada qualidade de água, à distribuição equitativa de acesso à água limpa e à defesa contra os desastres relacionados com a água, tais como inundações e secas.

As universidades desempenham um papel crucial para enfrentar esses desafios. Nelas, os futuros profissionais devem ser treinados e ter acesso às mais recentes descobertas em pesquisa e à educação continuada. A fim de desenvolver um efeito correspondente na sociedade, as universidades precisam expandir suas redes de cooperação e trabalhar com agências governamentais e empresas. Além disso, devem apoiar o processo de sensibilização social para a proteção ambiental e o uso adequado dos recursos hídricos.

Nesse contexto, CapWEM organizou suas atividades em diferentes grupos de trabalho. Os grupos foram divididos entre os seguintes tópicos: melhoria do ensino superior em todos os três ciclos: graduação, pós-graduação e doutoramento; estabelecimento de formação continuada nas universidades; promoção da cooperação entre universidades e instituições não-universitárias: transferência de tecnologia, desenvolvimento de normas técnicas, campanhas ambientais; melhoria da gestão de risco, particularmente em bacias hidrográficas transfronteiriças.

CapWEM foi desenvolvido entre os anos de 2011 e 2014. Os resultados mais importantes do projeto estão publicados nesta série de livros. O financiamento do projeto foi feito por meio do contrato n. DCI-ALA/19.09.01/10/21526/254922/ALFAIII (2010) 55, do programa ALFA da União Europeia, da Direção Geral EuropeAid. ALFA significa "América Latina - Formação Acadêmica", o qual é um programa para promover a cooperação institucional entre universidades da União Europeia e da América Latina.

A cooperação intensiva, durante mais de três anos, agregou uma gama de conhecimentos e experiências. As sete reuniões "milestone" do projeto levaram a equipe CapWEM a todas as universidades envolvidas no projeto, de modo a considerar as questões específicas de cada um dos participantes. Esperamos que, com a publicação dos resultados do projeto, possamos contribuir para enfrentar os desafios relacionados com a água e o meio ambiente na América Latina.

Os editores

VORWORT

CapWEM steht für „Capacity Development in Water Engineering and Environmental Management“ und ist ein Gemeinschaftsprojekt von Universitäten aus acht Ländern in Lateinamerika und Europa: Argentinien, Brasilien, Chile, Costa Rica, El Salvador, Paraguay, Portugal und Deutschland. Die Koordination liegt bei der Universität Siegen in Deutschland.

Zentrales Ziel des Projektes ist die Erweiterung der fachlichen Kompetenzen im Themenbereich Wasser und Umwelt in den lateinamerikanischen Partnerländern. Erreicht werden soll dieses Ziel durch die intensive Kooperation zwischen den Partnern und die Bildung von Netzwerken innerhalb Lateinamerikas sowie zwischen Lateinamerika und Europa.

Ausgangspunkt für die formulierte Zielsetzung ist die Tatsache, dass viele lateinamerikanische Länder vor enormen Herausforderungen stehen hinsichtlich der Sicherstellung hinreichender Wasserqualität, der gerechten Verteilung des Zugangs zu sauberem Wasser und der Abwehr gegenüber Katastrophen wie Überschwemmungen, aber auch Dürren. Hochschulen spielen eine entscheidende Rolle in dem Prozess, diesen Herausforderungen zu begegnen. In den Hochschulen werden die zukünftigen Fachkräfte ausgebildet, Hochschulen sollten aber auch im Rahmen der Forschung und Weiterbildung die aktuellen Fachkräfte mit neusten Erkenntnissen versorgen. Um eine entsprechende Wirkung in die Gesellschaft zu entfalten, müssen sich die Hochschulen öffnen und mit Behörden und Unternehmen zusammenarbeiten. Auch sollten Sie den Prozess unterstützen, in der Gesellschaft das Bewusstsein für den Umweltschutz und den angemessenen Umgang mit der Ressource Wasser zu schärfen.

Vor diesem Hintergrund hat CapWEM seine Aktivitäten in unterschiedlichen Arbeitsgruppen organisiert. Diese arbeiteten zu den Themen Verbesserung der Hochschulausbildung in den Bachelor-, Master- und Promotionsprogrammen; Etablierung von Weiterbildung in den Hochschulen; Förderung der Kooperation zwischen Hochschulen und außeruniversitären Einrichtungen durch Technologie-Transfer, Richtlinien- und Normenentwicklung sowie Umweltkampagnen; Verbesserung des Risikomanagements, insbesondere in grenzüberschreitenden Wassereinzugsgebieten.

CapWEM lief über einen Zeitraum von dreieinhalb Jahren von 2011 bis 2014. Die wesentlichen Ergebnisse des Projektes werden nun in einer Schriftenreihe veröffentlicht. Die finanzielle Förderung erfolgte unter der Vertragsnummer DCI-ALA/19.09.01/10/21526/254922/ALFAIII(2010)55 aus dem EU-Programm ALFA der Generaldirektion EuropeAid. ALFA steht für "América Latina - Formación Académica" und ist ein Programm zur Förderung der institutionellen Kooperation zwischen den Hochschulen in der Europäischen Union und Lateinamerika.

Die intensive Zusammenarbeit über einen Zeitraum von mehr als drei Jahren war mit vielfältigen Erkenntnissen und Erfahrungen verbunden. Die insgesamt sieben Projekttreffen führten das CapWEM-Team an alle beteiligten Hochschulen, so dass landes- und hochschulspezifische Problemstellungen ebenso wie vorgefundene Lösungsansätze berücksichtigt werden konnten. Eine große Anzahl Studierender und Berufstätiger profitierte von den Aktivitäten. Wir hoffen, mit den Projektergebnissen zur sozio-ökonomischen Entwicklung Lateinamerikas beizutragen und die Akteure zu unterstützen, den Herausforderungen beim Thema Wasser und Umwelt besser begegnen zu können.

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STRENGTHENING ENVIRONMENTAL AWARENESS

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PREFACE

The study "Strengthening Environmental Awareness" focuses on the link between the media and the community with Higher Education Institutions, contributing to the development of tools for increased awareness for environmental care and for responsible use of water resources.

Taking for basis the collection of experiences in which the link University - Media - Community was decisive to achieve specific results related to environmental issues, this study proposes a series of actions to promote environmental awareness .

During CapWEM project, between 2011 and 2014, different actions were led by eight participating universities. This publication covers one activity, on "Concepts for Environmental Education".

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1 Introduction

The term "sustainability", used to regard development, production, resource management, is also commonly used in the discourse of policy making. Sustainability is only possible by improving access to technical and management information and promoting the participation of different interest groups, such as public organizations and the implementation and creation of regulation.

It also highlights the need for greater involvement of the university with civil society. It is a key mechanism to introduce researchers, teachers and students to the media or to mechanisms of knowledge, studies and results exchange, with interest groups of the field. This has been only possible with constant activities that contribute to public activity, until now unusual at university spaces, and traditionally closed to them. The relationship between Higher Education - Media has been approached from different field-areas and has become relevant in recent years. One example is the International Conference on Media and Higher Education developed in Canada, happening since 2011. "How does the media cover higher education issues around the world? How is public perception of this coverage? Do academics identify themselves with the media? Can academics help the press to disseminate complex topics in an accessible way?" are some of the questions raised to address the issue.

On the one hand, there is the necessity to change Higher Education Institutions (HEIs) in their way of transmitting and sharing knowledge in mass scale. On the other hand, there is the need of the media to address current issues with a less alarming perspective, but only adjusted to reality.

In order to achieve these goals, HEIs should become one of the major players to provide access to information. As well, HEIs should invest in training participative students and in directing research projects related to the general interest, such as the "Millennium goals".

2 Environmental awareness: A challenge for Higher Institutions

The promotion of critical reflection on issues of Environmental Education, not only regarding formal education, but also activities that can be integrated in interdisciplinary fields is a challenge for Higher Education Institutions. Spaces used for the promotion of reflection on causes and consequences of issues, allow not only knowledge creation, but also more awareness, by exploring new visions and concepts and by the invention of new techniques and tools of investigation. "Education is definitely the best and most effective way of mankind in the search to achieve sustainable development" (UNESCO, 1997).

Since the United Nations Conference on Human Environment held in Stockholm, in June, 1972, the concept of Sustainable Development has been incorporated to the prevailing development model (GOMEZ OREA, 2007). Several conferences have been held internationally promoting the need of environmental education. In one of these conferences convened by the United Nations on December, 2002, the Decade of Education for Sustainable Development was defined to be developed between 2005 and 2014. It has aims to integrate during the decade the focus of the integrated concept of sustainable development in all aspects of learning, as a way to promote changes in social behavior. "The

principle of sustainable development must find its place in the education of children, higher education, non-formal education and the media". (UNESCO, 2002).

Such changes in education and their influence on the education process do not only create public awareness and understanding, but also through an informed and aware citizenship, demand increases for the incorporation of environmental issues in curricula. Students and professionals trained with this new perspective will turn into multipliers for the incorporation of public policies in the implementation of adequate actions for environmental protection in development projects. Readjusting the traditional way of knowledge transfer in isolated categories allows an interdisciplinary focus in nowadays social issues. (UNESCO, 1997).

Education for sustainable development as a millennium goal requires the readjustment of training in Higher Education Institutions; for instance, in the formal structure, and also through the interaction with other sectors of society.

In this sense, environmental awareness built on common information and shared understanding, generates not only mobilization of public support, but also facilitates the interaction in the development of participatory works through the integrated approach of different fields of science.

The incorporation of concepts of sustainable development in a transversal approach to Higher Education Institutions requires the understanding of concepts that go beyond purely technical issues. It goes to the analysis of complex problems towards the integration of new approaches in the transmission and creation of knowledge. Nowadays, those approaches are incorporated in the different environmental issues, for implementing new ways to address problems. Different international forums define the most relevant environmental issues as problems of water resource management. Water resource management in developing countries is particularly complicated given that there is still lack of knowledge on water resources, on quantity and quality and on requirements of supply and demand. Education on topics of water is a strategic starting point for developing a new ethic on water governance. In this sense, there is a need of developing and implementing educational programs that promote a greater understanding of this issue, in projects including priority sectors in consumption, conservation and protection of water resources. (UNESCO, 2002).

The challenge is then to achieve the transfer of knowledge in those topics of current relevance, to create social awareness from mechanisms that allow the approach of Higher Education Institutions to other sectors of civil society.

In this sense, "both the expert and the generalist can help to make this happen". (UNESCO, 1997).

3 The role of the media as opinion makers

The media have been since its origin an instrument for influence on thinking and acting. Several themes become relatively relevant in everyday life, based on how they are treated and diffused by the media to the community. This way, they are an essential tool for raising awareness and training of citizens in several public issues.

The traditional communication scheme implies a transfer of information between a sender and a receiver. What happens when the receiver has a message totally strange from his/her knowledge? Which are the consequences if the message is distorted, either because of ignorance or lack of resources of the sender?

This perspective on communication supports changes since the communication process stops to be regarded as a message transmitted from a sender to a receiver, and starts to be considered as a process focused on the receiver and on the message. Currently, the process of communication (exchange of meaning) and the significance of this process are emphasized (social relations created by communication, social institutions and the resulting context of these relationships) (FAO, 2007). This bidirectional relationship requires special attention to topics of general interest, in particular to environmental issues currently of concern to communities. This way, journalists are key players for environmental awareness; journalism in its simplest mode helps people understand their reality. (UNESCO, 2008). Global discussions on environmental issues take special importance on the training of these actors, taking as key point environmental education topics within the framework of United Nations' Decade of Education for Sustainable Development.

With the Water for the Promotion and Communication Program, in the framework of the International Decade for Action "Water for Life" 2005 - 2015 (UNW-DPAC), the United Nations recognizes the importance of the media in improving awareness and facilitate a better understanding of problems related to water. In addition, several training activities to promote environmental issues from the media multiply in increased frequency, as in the case of international conferences and meetings, publications of social communicators and the use of new technologies for solving those issues, such as forums, blogs, social networks, etc.

In order to transmit information related to issues of water, the media must identify relevant and reliable sources, what in turn, allows them to send a clear message and to direct it for the formation of environmental citizenship.

Social communicators need to get the correct information, get informed and avoid being biased. In some countries, it may be important to consider the role of these actors as more than simply reporters, a challenge that has to do with incorporating changes in how perceptions and attitudes of people are related to issues such as sanitation, for example. (DWGMF, 2011). Water issues are addressed in several reports of all kinds in the media, not always as a protagonist, but as a necessary participant on issues related to agriculture, production, urban development, etc. The understanding of those topics follows a parallelism with the paradigm of change of the academia. On the one hand, it is focused on the need for hydraulic structures that may satisfy a continuously increasing need for water consumption. On the other hand, and to a lesser extent, stands the need for an approach to integrate ecological, social and economic dimensions in planning and management of water resources. (Veron, 2014).

Hence, it is important to strengthen the training of social communicators, by addressing environmental issues with the perspective of sustainable development. Thus, it would be necessary an elementary training, in different subjects, not as a specialist, but also to acquire tools that allow sharing knowledge of experts in a common and understandable language to the average citizen, and to be installed as a topic of discussion and debate at all spheres of the community.

4 An approach to the media through Higher Education Institutions. Study Case: CapWEM Partner Universities

By taking a first look at the way the media approaches water issues in those countries participating in CapWEM, and by emphasizing the link between the media and government agencies with Higher Education Institutions, an analysis was conducted on the impact of those relationships on the community.

4.1 Methodology

With the intent to use an information basis to enable the analysis of communication strategies, a survey was conducted with the eight universities of CapWEM project participating countries, to get relevant information on regional and national levels.

The survey was developed from a questionnaire (prepared as questions accompanied by tables). It analyzed the consideration of environmental issues (particularly related to water) and the way and frequency of their appearance in the media, using a specific assessment scale.

The questions were structured into four main items: general questions, questions regarding relationship between the Media and HEIs, questions related to the relationship between government agencies, and an open question to suggestions.

Regarding the raised questions with structured type response option according to the scale mentioned above:

A) General Questions: Which do you consider will be the interest group? Which do you consider will be the target group? Media that have sections related to "water".

B) Relationship between Higher Education Institutions and Media: Does your University possess any means of media? Which? Does this media have any space destined for the diffusion of the subject "water"? Does your university have space in other media?

Which ones? Is this space of easy access for the University? Is it free? Who is the sponsor of these publications?

C) Relationship between agencies and media: Presence of responsible regulations about Media.

See Annex: Survey Model

4.2 Obtained Information

The information provided by the partners enabled an analysis about the situation of the relation Media - HEIs in the different countries. This information is fundamental to identify which are the mechanisms of interaction between them.

In particular, it can be inferred that there is a growing interest from HEIs to create relationships with the community, and the more comprehensive mechanism is in all cases to keep its presence in the media. It functions to communicate results of research groups, to make public the policies of greater involvement with the problems of the region or to promote

the training of both future graduates and members of enforcement agencies through continuing education mechanisms.

Universities have been progressively implementing their own radio and / or television stations. This is an important effort for the creation of their own material about university activities, to the production of a permanent relationship with the community.

4.3 Comparative Analysis

Given that universities provided this information, it has an intrinsic value. It is analyzed how the relationship Media - HEIs works and it can be identified which are, in their criteria, urgent topics to be addressed by CapWEM objectives to the media.

Regarding the general questions and the answers received, most members agreed that Agencies (mostly), Enterprises and Media are interest groups, whereas Citizen and Students appear as the main members of target groups.

Considering the sections related to water in the media and the partners' answers can be concluded that, with respect to television, the approach to water topic occurs frequently and mostly in a national scope. Management appears shared between public agencies and private ones. Regarding the sponsors, it can be said that most partners answered "others", for example in the case of Germany, the population pays radio and television license fees. In the second place, the government appears as sponsor. For the web, characteristics are similar, except that industry and government stand out as major sponsors.

In respect to the radio, as well as to television, it appears frequently approach, and mainly the sponsor "others", whereas public management stands out slightly over the private sector. Countries like Costa Rica and El Salvador identified a national range, whereas Argentina and Brazil showed predominantly local / regional range.

Regarding newspapers, it stands out national and regional ranges. Management is mostly private and sponsors are balanced between trade, industry and government, whereas it stands the item "others".

Finally, in "other media" (Own publications, participation in specific meetings, etc.), a similar percentage is observed between frequency and infrequency of the topic water. The range is mainly national and the management is shared between public and private entities. The situation regarding sponsors is similar to the newspaper one. Concerning relevancy, members do not show priorities. All agree that in a greater or lesser extent, in television, radio, newspapers, web and other media the topic water is addressed from different points of view (saving, suitable use, conservation and others), in the last case (others) can be mentioned that in our country (Argentina), people talk about the subject water only in case of emergency. Upon the relation between HEIs and the Media, most of the members (Argentina, Brazil, Portugal, Costa Rica, Paraguay) explain that at their respective universities they have their own media.

For example, at FRBB-UTN exist radio and publication medias, but they do not have a regular column designed to water. Overall, partners agree that there are no spaces specifically for water on their own media, but in some of them there are spaces dedicated to environment, which eventually includes water issues in a non-systematic way. The only partner who has space destined to its own media to water is El Salvador.

In respect to space in other media, there is similarity between the percentages of members who have space (for example, Brazil) and who do not have (for example, Costa Rica). Those who have space have easy access to it and the cost depends on the media which is concerned.

Sponsors depend on the media. For example, in Brazil, the main sponsor is the federal government, but the profits collected from products and services are also used to cover the publications. Eventually, private organizations are sponsors too. Portugal has publicity spaces on its own journal (private sponsors) and with the income from the sale of publications. In El Salvador, the university has to pay for the space.

Given the information obtained, it is observed that in general universities have easy access to the media. In Argentina, for example, the access to media is easy, but it is not frequently used.

The analysis of the results shows that, in the partner countries, the subject water does not normally have exclusive spaces, but only in cases of emergency or eventually within a block of environment.

About the relation between Agencies and Media, for example, in Argentina, there is presence of agencies' members in the media (ABSA - Aguas Bonaerenses SA -, ADA - Autoridad del Agua -, MBB - Municipalidad de Bahía Blanca -) whereas the tendency is sporadic, only in emergency situations and with informative purposes.

In Brazil, the situation is similar, except because of a trend, sporadic in some cases and continuous at other times, whereas the purpose is divided between informative, educational and explanatory according to the media. The same applies to El Salvador.

4.4 About interest groups and Target Groups

During the evaluation, while trying to define who assume those roles, it has been detected that Agencies (mostly), Enterprises and Media are interest groups, while Citizen and Students appear as the main members of target groups.

However, when looking for the capacity to create proposals to ensure greater involvement and to increase participation in decision-making for environmental management and resources such as water, it is perceived the necessity to explain shared responsibility and the right to be heard in all sectors of the community. This concept should be clear in the training of undergraduate and postgraduate students, who should be seen as future members of spaces for decision-making, and as generators of policies and regulations, as they incorporate naturally the need of participation of all interested sectors.

In this context, it is proposed that, in reality, students and citizens are seen as interest groups, to ensure active participation and communication channels to improve the representativeness of all of them.

4.5 Conclusions

As a result of this study, it is concluded that it would be necessary to have spaces dedicated to “water”, since it is considered a human right. But due to the lack of formation and information of the actors, this objective is far away. Answers of the partners show different situations, primarily between Europe and Latin America, in reference to the presence of the HEIs in the media. It provides useful information for communities, although it has perceived no uniformity between Latin American partners.

The establishment and maintenance over time of covered topics of interest of this project requires an institutional decision policy, which ensures the support in terms of resource allocation. Such possibility, although clear, competes with many other topics of interest that impede the prioritization of this objective.

Finally, it shows the need for presence in the media, and there are explicit requirements for HEIs when emergencies occur: floods, droughts, lack of water, etc.

For this reason, and to ensure the necessary prestige that universities must have in their communities, it is important to have clearly defined at each institution with which issues it works and with which has it expertise. It allows HIEs to opine adequately, obtaining useful interventions that support decision-making, avoiding the intervention in topics there is no critical mass to ensure the quality of information placed in the media.

The mere fact of being a university does not include the universality of knowledge. Interaction with partners has enabled not only to analyze different alternatives and possibilities, but also to assess in which cases the experience can be adapted and adopted and in which cases we should consider local idiosyncrasy, looking for other mechanisms to solve the same problem.

An example of this is the relationships that currently have enforcement agencies with universities in Germany. It is a very different example from the one in Argentina, where trusting channels are supposed to be built and to interact constructively.

5 The building of links HEIs - Media - Community: Experiences collected from positive examples

It is very important to work on strengthening the link between media and community, in order to achieve the awareness on topics related to “care and responsible use of water resources”.

To facilitate the link between media and community through HIEs, it is presented the need to providing tools to facilitate the relationship between agencies - media – community. It is done by identifying weaknesses in the transmission of information on topics related to water resources.

It has been agreed on the convenience of generating tools that allow training of journalists in addressing environmental issues. For instance, the strengthening of training of responsible people from agencies, who must necessarily provide information through the media and the communication between them, in an accessible format and vocabulary.

5.1 Case Study: Integration of academic activity, communication, government and community. Contributions from their perspectives

The following example shows a case initiated from academia with the objective to link different sectors of the community and collect experiences and requirements derived from participants.

The activity was carried out on November 2011, in Bahía Blanca city. It intended for an interaction between the academic field and opinion makers, media of the region and responsible people for public and private agencies in charge of water resources management. The model of activity was a workshop, with presentations by speakers linked to the academic field, government officials and information sector. These exhibitions served as an outset for the work group exposed above.

The main objective of the meeting was to generate a space for the exchange of experiences and discussion on the role played by environmental communication as an educational tool and of interaction between authorities, agencies, media and community.

5.1.1 Methodology

It was intended to elaborate an overview, on how environmental communication works today regarding to the topic water, trying to make a diagnosis in order to propose possible action lines that allow an improvement from the point of view of Higher Education.

The activity was divided into three blocks, according to the participants: referents of institutions and agencies involved in water resource management, media and interest groups (community).

The modality of the meeting was a workshop with an initial framing exposure and the proposal of a case study, which addressed the modalities and hypothetical responses to a particular situation.

External moderators, as well as CapWEM local coordinators presented these study cases.

After the presentations, participants worked in groups on the analysis of potential environmental problems. The exercise was designed to solve how to communicate to the community about a specific situation.

As an integrative activity, a plenary was proposed, where the conclusions were presented to the participating groups.

During the development of the activity, the events were attempted to be captured in an impartial perspective. For this purpose, external observers were present at the activity, and their task was to observe from a personal perspective and from their training, resulting complementary to the one of the organizers, moderators and participants.

5.1.2 Results

As conclusions, it can be said that journalists have no possibility to focus their interest on no impactful topics. Moreover, researchers and scientists do not usually write documentation of disclosure in plain language, understandable by the public without specific language, because they fear being judged by their peers.

From the discussion of conclusions, the following proposals emerged as future activities:

- Training for journalists on environmental issues.
- Training for agencies about the use of common language that facilitates comprehension.
- The need of universities to provide information on several problems.
- Deepening knowledge about Environmental Public Information Law.

5.1.3 Analysis and final reflections

An inconvenience in the analysis of means of communication and the legislative sector, results in a problem to be affronted. This type of work joins activity with workshop dynamic, and was very successful for the establishment of the guiding principles of water policy. It has achieved a broad participation of actors, although there has been a lack of communication between sectors and legislative, and a related law was enacted before the disclosure of these guiding principles.

The organization of joint activities with other sectors is seen as a good way of exchange and approach between different sectors of civil society in the management of water resources. An approach to critical situations and to the minimization of any conflict situation shows the importance of responsible information management by agencies and the media.

In part, this is consequence of not having responsible personnel in the areas of communication and media of agencies. Also, the language used at the agencies sector, as well as the one used by specialists in the academic sphere, is not completely accessible for the community.

On the other hand, specialists may not want to get close to the media because they fear critics and incomprehension of their lexicon. It leads to the need for information from the citizens, who require it and when cannot obtain it from the competent agency or do not know where look for the requested information, looks for it in the media. It is the way to reach the agencies when they do not respond. As the media cannot always have easy access to specialists, information is usually not certain.

The registration achieved was particularly useful for the analysis of the activity and the elaboration of the conclusions.

5.2 Case Study: Influence on the results of an infrastructure project based on academic intervention for environmental awareness

In October/November 2011, in the region of Bahía Blanca, facts prompted the analysis of the influence of the media and the HEIs on the public opinion. A project of a dock for LNG (Liquefied Natural Gas) supply had been under development to be installed at Cuatros Port, a port of the city of Bahia Blanca, Argentina. Reports made by different research groups from universities, research centers and higher bodies of the universities concluded against the location of the project, and they had a great impact over the media, and on the general public.

5.2.1 Origin of the conflict

The knowledge of that project and of its Environmental Impact Study became relevant in the local media, led by the active participation of universities and other sectors of civil society.

At first, the project considered the location of a fuel supply activity for local-regional use in the area of Puerto Cuatrerros. After information was filtered, it came to public knowledge the highlight of serious shortcomings administrative issues and governance management.

5.2.2 The academy as a promoter of environmental awareness

The outcome of discussions upon topics of that kind is relevant in times of crisis. In such context, facing the imminent construction of a port and a regasification point inside the estuary of Bahía Blanca-Cerri, and as well attentive to the severity of the damage that would be produced; there had been seen an active participation of entities and of civil society.

Due to the social commotion generated by the project, several NGOs made submissions to the Ombudsman (an agency at the service of citizens, to take care of their rights and to act at contentious administrative issues), who at the same time requested the opinion of the HEIs upon the installation of the project (Research Groups from Universities and other governmental scientific bodies). A public audience developed in a messy way. A large and patient audience participated, despite political manipulation.

As it could be observed in this case, the dissemination of scientific opinions and of HEIs visibly impacted on the outcomes of the conflict. National universities of the city concluded that such project raised serious environmental risk for the internal part of Bahía Blanca estuary.

Some groups were openly against the project, others reserved their opinion to the limited time available for data analysis.

Particularly GEIA (Environmental Engineering Study Group) and the Department of Civil Engineering, at the Bahía Blanca Regional Faculty of Universidad Tecnológica Nacional prepared an integrated document of environmental analysis by professors and researchers. Statements emerging from the scientific sphere, encouraged the position of a large sector of the general public. It caused protests via manifestations, websites, formation of social networking groups and different activities, that aimed at raising awareness about the vulnerability and importance of the conservation of the estuary.

5.2.3 Analysis and final reflections

Situations of "emergencies" generally promote projects that cannot have in-depth analysis, or studies and alternatives that may consider the environmental effects adequately.

In this context, the information to be obtained from media usually is limited, biased or invalid. In addition, the media counts on different economic groups among its sponsors, which suggests that may not be full transparency in reporting news related to environmental issues. Yet, independent media may make public such situations and coverage conflicts step-by-step.

In this particular case, the appearance of the situation in the media, showed how from an approach of scientific statements through the media can be determined the development of a conflict and its resolution.

5.3 Case Study: Napostá Stream. Its integration to the urban dynamic

Bahia Blanca has a stream that crosses the city creating different environments along its course. Academics and governmental institutions have been studying and working for years on the treatment of the Napostá Stream. A campaign for awareness of the value of this water resource aimed at creating an environment of discussion, that prevents fragmentation in proposals and that changes the way people perceive the stream. It also aims at looking for ways to use it for recreation and generating an agenda that includes preventive actions to flooding.

5.3.1 Methodology

The study was developed as a workshop, after a brief presentation about CapWEM and the External Study "Revaluation of Napostá Stream and its integration into the urban dynamics of the city of Bahia Blanca", performed within the framework of CapWEM project. Two participatory meetings carried out the exchange of concepts aimed to promote, from previous and future proposals, the change of the way people perceive the stream, and to look for ways to use it for recreation.

At the first meeting, interest groups were invited to attend in regard to their closeness to the resource or to their role in the city, as standards applicator, communication representatives, legislators and representants of civil society. As well, there had been significant participation of members of clubs, promotion societies of different neighborhoods, academics and researchers, as well as local government representatives.

The results of the external study developed within the framework of CapWEM were presented, as well as other previous works related to Napostá Stream.

The interaction was active and created interest among participants. Results of the study were also presented at the Municipal Conference for Environment of the city of Bahía Blanca, in 2012.

The second meeting was also useful, as the starting point for a sustained work in creating an agenda that includes preventive actions to flood as well as in improvements in the use of resource for well-being and recreation. Many of the previous participants also attended this meeting, such as local legislative and executive authorities, as well as broadcast media. An interesting impact on the media was achieved, from which it is expected to get concrete actions from a mentioned agenda of policies and possible changes.

5.3.2 Results of activities

These activities created spaces, reflected in the following results:

- Creation of a web page that facilitates information outflow
- Awareness of the topic by the media
- Knowledge and information exchange between studies on the field
- New model of participation and integration of different fields
- Future presentation of the topic in the Honorable Deliberating Council
- Creation of an agenda
- Potential participation of the University in the technical evaluation of proposals that might arise from the courses related.

5.3.3 Analysis and final considerations

This "case study" allowed mechanisms of interaction to be tested between HEIs, enforcement bodies, interest groups (civil associations, etc.) and the media. In particular, it is highlighted a "lack of integration" in the actions that have affected historically the Napostá Stream and its relationship with the city of Bahia Blanca.

It is important to present all available information, making it accessible to citizens as well as to decision makers. This progressively creates a space for discussion, that allows sharing points of view.

Activities regarding the Napostá Stream threw general recommendations for the reevaluation of the water resource, which could be extrapolated to generic cases. Some of the proposals are:

- To promote the creation of a committee for watersheds, in order to preserve and manage resources, to maintain a minimum ecological flow to ensure aquatic life, ecosystem compositions and structures, to evaluate the feasibility of a controlled increase of water levels and to use the profundity for sports, to clean and maintain the pipes and channels of the stream, because of the vegetation that blocks free runoffs, or because of accumulated solid waste.
- It would be also positive for managing the stream, the creation of a specialized municipal body, responsible for analyzing proposals, projects and studies related to water issues and to carry out management actions between the civil society and city authorities. This municipal body could work together with the local universities, scientific research institutions and nongovernmental organizations, such as factoring societies or environmental groups. Such actions would encourage the development of activities to spread information awareness, looking at the value of resources and at the preservation of environmental conditions.

5.4 Case Study: Economic valuation of ecosystem services in the Mataquito River watershed at Maule Region of Chile - an application of choice experiment method

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5.4.1 Introduction

Watersheds provide valuable ecosystem services to society, such as the regulation of water supply and purification. Mataquito river basin in the Maule Region, Chile, presents severe problems related to the provision of these services. They include (1) low water availability during the summer season, (2) lack of infrastructure for storage and distribution of water, (3) lack of coordination between communities for the protection of water quality, (4) poor water quality in the Central Valley because of the concentration of population, industries and intensive agriculture (diffuse pollution), (5) poor sewage treatment in rural areas and (6) lack of legal tools and technical information for proper management of water resources.

Since ecosystem services remain outside the traditional markets, they are undervalued and consequently exploited. A technique to estimate monetary values of non-market ecosystem services is the choice experiments method (CE). CE is based on reconstructing the economic preferences of people from the elections made in alternative valuation scenarios during an interview (Bateman et al., 2002). Each scenario is based on the combination of relevant attributes of the good or service and their level of provision. Several studies have used this method with satisfactory results (Morrison and Bennett 2004, Hanley et al. 2006ab, Bateman et al 2006). However, the CE method has been little used in Chile.

In this context, an economic valuation study was conducted to analyze the preferences of the population, especially farmers with irrigation systems, for improvements to the current state of ecosystem services in the Mataquito watershed. For this, a Choice Experiment (CE) including the relevant attributes related to improvements in watershed ecosystem services was applied. In particular, the determinants of respondents' preferences for improvements in the protection of ecosystem services such as relation and attitudes towards water resources and socio-economic variables were analyzed. Furthermore, the maximum Willingness to Pay (WTP) of respondents for the implementation of measures to improve the current situation in the Mataquito river basin was estimated.

5.4.2 Methodology

Mataquito watershed has an area of 6,190 km² and it is composed by the sub-basins Lontué, Teno and Mataquito (Figure 1). The average flow is 153 m³/sec with the sub-basin Mataquito presenting the greatest variability (MOP, 2011). The basin has a Mediterranean climate with an average temperature of 19°C and a range between 30°C and 7°C. The

average annual rainfall is 740 mm, highlighting a dry period of about six months. In addition, the basin has a population of 276,825 inhabitants, distributed in nine municipalities, with 73% of urban population (INE, 2005ab).

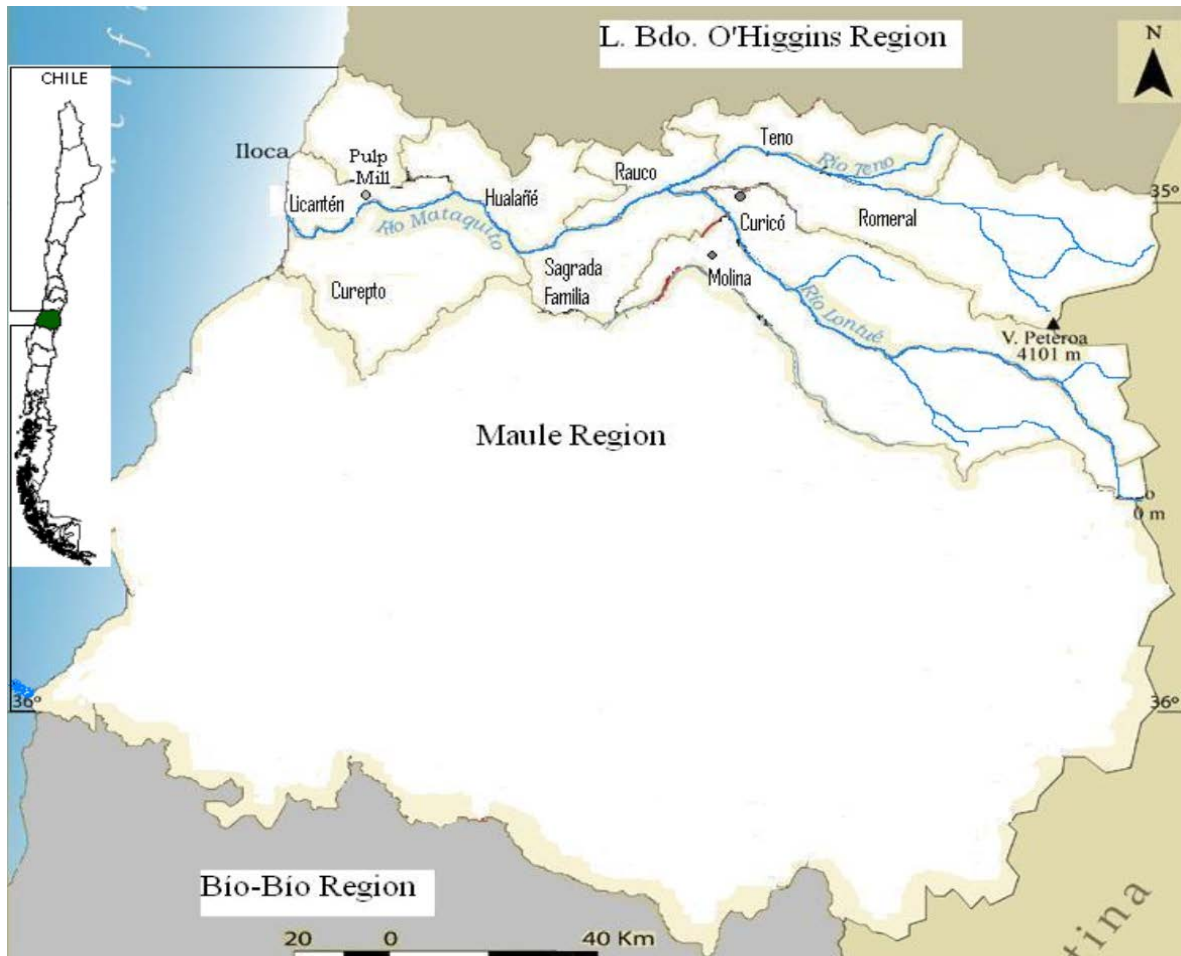


Figure 1: Mataquito river watershed (Adapted from Biblioteca del Congreso Nacional de Chile, 2007)

The study population corresponds to farmers of water user organizations in the Mataquito watershed. In particular, the sampling frame included farmers from organizations such as supervisory boards, canal associations and water communities. A list of farmers based on information provided by representatives of supervisory boards, the General Water Directory and organization web page was prepared. Then a simple random sampling of 380 farmers, keeping population proportion per community, was conducted. For collecting information, a questionnaire through face-to-face interviews conducted by eight trained interviewers was applied.

To select the attributes to be valued workshops with representatives of the Municipalities of the nine communities and a workshop with representatives of public institutions and researchers were conducted. In addition, personal interviews with representatives of water user organizations, public institutions and researchers were carried out. Finally, a comprehensive literature review of the study area background was conducted.

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As a result of the above activities, the following attributes were selected: (1) improvements in the conditions of flora and fauna in the river, (2) protection of water quality through prevention and control measures, (3) security in water availability during the year and (4) storage capacity of water through reservoirs. Each of these attributes has two levels of provision (or improvement) plus a third one that represents the current situation - status quo (Table 1). In addition, a payment attribute of five levels is included. It represents respondents' willingness to pay (WTP) for environmental improvement presented in different scenarios. As a payment vehicle an additional charge to the monthly water bill for a period of 10 years was used.

Table 1: Attributes and levels in the choice experiment

Attribute	Definition	Levels
Flora and fauna in the river	Condition of flora and fauna in the river	Regular to very bad (sq); at least regular; good
Water quality	Measures for protection of water quality	No additional works (sq); new treatment plants; new treatment plants plus pollution prevention measures
Water availability	Security of water availability during a year (months)	6 to 7 (sq); 8 to 9; 10 to 11
Water storage	Water storage capacity in the watershed (mill m ³)	75 (sq); 200; 325
Payment	Monthly charge to water bill by 10 years (CLP\$)	0 (sq), 1,000; 2,500; 4,000; 5,500

sq: current situation (*status quo*).

From a full-factorial design of 4 attributes with 3 levels each plus a 5-level attribute, 240 possible attribute level combinations can be obtained. With an orthogonal main effects design, it is generated a reduced orthogonal experimental design with 23 different scenarios (=choice cards A) (Hensher et al. 2005:115). Using the shifting procedure described by Chrzan and Orme (2000), permutations among the attribute levels of these 23 choice cards generate 23 additional scenarios (choice cards B). These 23 pairs of alternatives are randomly assigned to each choice set. Each choice set consisted of two environmental improvement scenarios (A and B) and an 'opt-out' scenario that represents a status quo where no environmental improvements are achieved and the payment is zero (cards A). The 23 choice sets were split sampled into three sub-samples. Each respondent is asked to choose one scenario from each of the choice sets assigned (Figure 2).

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SET 2	Condition of flora and fauna	Protection of water quality	Security of water availability	Water storage capacity	Monthly charge to water bill
					
Alternative A	Regular to very bad	New treatment plants plus pollution prevention measures	8 to 9 months	200 million of m ³	\$ 5.500
Alternative B	At least regular	New treatment plants plus pollution prevention measures	6 to 7 months	325 million of m ³	\$ 2.500
Alternative C (current)	Regular to very bad	No additional works	6 to 7 months	75 million of m ³	\$ 0
I would prefer Alternative: _____					

Figure 2: Example of choice set

The designed questionnaire is subdivided into several sections which include questions about the relationship and attitudes towards water resource, description of the valuation scenarios, choice experiment, follow-up questions to find out the reasons for the payment or non-payment and socio-economic questions. The questionnaire was pre-tested in the field, which allowed making adjustments necessary for a proper understanding of the questions by the respondents.

Based on the choice experimental data two Nested Logit (NL) models were estimated (Hunt, 2000). The structure of the most reliable models was obtained through NLOGIT 4.0 software. First, a basic model including only attributes to identify the most important attributes to respondents was designed. Secondly, an improved model that included interaction variables between attributes and attitudinal/socio-economic variables was estimated. This model allows identifying whether the interactions terms have an influence on the preferences of respondents. In addition, both models include an alternative specific constant (ASC) which collects systematic variations between alternatives A and B that cannot be explained by attributes. The interaction between the ASC and the studied variables can also influence preferences of the respondents.

5.4.3 Results and conclusions

The results indicate that respondents give the water resource mainly a productive use and thus the availability of water for irrigation is essential. Lower importance for farmers has the conservation of flora and fauna in the river, water quality and flood prevention. The lowest importance is attached by respondents to the possibility of conducting recreational activities.

The attributes were significant determinants of WTP for improvements of the current status of water resource (22-30 M\$/year). These values are relatively high considering the low average household income which realizes the importance that respondents attributed to water.

Younger and more educated farmers who live in the watershed central valley are more likely willing to pay for improvements on watershed ecosystem services protection. Security in water availability and storage capacity were the most important attributes to respondents. The results emphasize the importance of protecting ecosystem services and integrated watershed management in the region in general.

The Choice Experiment method proved to be an efficient technique for valuing ecosystem services that have no market value. It is expected that this method has important applications in the design of agro-environmental policies in Chile in the future.

6 Conclusions

The importance of creating awareness on issues of water and environment is based on the need of involving all sectors of civil society to ensure sustainability in resources management.

The CapWEM project enabled to consider experiences, expectations and actions in regard to improve the integration of capacity development, training of professionals - with participative skills and sensitive to the problems of the community -, the media, enforcement agencies, civil institutions and the community.

In general, there is a basic awareness available on the importance of water as a resource. However, water is regarded as a production factor (in agriculture) rather than as a prerequisite for environmental quality. The results from a case study in Chile show, that even in low-income communities, there is a "willingness-to-pay" for water. The younger and the more educated farmers are, the more likely they are willing to pay for improvements on watershed ecosystem services protection.

It is worth noting that discrimination between "interest groups" and "target groups" finally results in the need of generating a single, common workspace. There is a continuous exchange of data across sectors, making problems visible, studying solutions and more suitable alternatives and facilitating the creation of legal frameworks. Using permanent communication through the media can be a tool for agencies to give the community all available information in an understandable language. Issues related to sustainability in terms of water and environment are new, in the sense that there is no a traditional discipline within HEIs. Yet, there is plenty of research to ground decision-making, that must be properly integrated for the participation of multiple sectors.

In general, the interest of media in these issues is limited to special situations such as emergencies, disasters (flooding) and water shortages. Often, this is also related to the demand from civil society for more information and further requests for intervention of agencies, universities or research centers.

In these cases, the weakness of the information channels becomes obvious. They do neither have specialized journalism or agencies nor scientific academic institutions, able to express results in an understandable language.

Given the context, different lines of action are recommended in order to increase environmental awareness and to contribute to a better quality of life with sustainable development:

- Inside Higher Education Institutions

Including water and environmental issues into the topics for training professionals, in order to enable them to adapt to different situations, like demands of the community or of enforcement agencies or of regional specific requirements of natural resources.

Therefore working groups should be established including research, technology transfer and teaching activities.

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Higher Education Institutions must be able to respond to consultations in those topics on which they have adequate capabilities to ensure the quality of the intervention, hence, becoming reliable referents.

It is important to merge open access databases and to make them accessible for decision-making and disclosure.

- With media

To offer specific courses at Higher Education Institutions that teach journalists to adequately communicate environmental issues to the public; to facilitate access to reliable information; to promote the interest of scientists and academics to provide easily understandable material without including scientific jargon.

To have permanent exchange between the media and the HEIs, using information and communication technology (ICTs) as a direct contact with the community.

- With the government (executive and legislative) and enforcement agencies

To achieve a permanent interaction between Higher Education Institutions and research centers with policy makers and politicians to ensure improved decision-making. This can also contribute towards avoiding overlaps of tasks, laboratories and specialists, towards seeking a strong complementarity of the sectors, and towards providing a clear vision to the community.

- With civil institutions and the wider community

Through the actions already mentioned, the community can have information on demand, facilitating adequate participation and awareness on environmental issues. Interaction must be feasible in order to enable a holistic view on and analysis of problems.

The above-mentioned activities should be mainstreamed in explicit policies in order to make mechanisms and results independent of the actors at any time.

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Annex

ANNEX: Survey Model

It was used the following survey model:

A - General questions

1) Which do you consider will be the stakeholders?(Mark with a cross)

- Agencies
- Enterprises
- Media
- Others

2) Which do you consider will be the target group? (Mark with a cross)

- Citizen
- Students
- Teachers
- Authorities
- Others

3) Media that have sections related to “water”. Please, indicate the media name.

	Name	Scope (National - Regional - Local)	Management (Public - Private)	Sponsors (Industry- Trades- Government -Others)	Relevancy of treated topics (from 1 to 4)			
					Saving	Suitable Use	Conserv.	Others (*)
Television								
Radio								
Newspapers								
Others (Own publications, participation in specific meetings)								
Web (Blogs, etc)								

They can be fixed or variable sections, which are treated only in specific moments.

Please, indicate relevance of appearance in media (vf: very frequent - f: frequent - i: infrequent).

B - Relation between Higher Education Institutions and Media

- 1) Does your University possess some media? Which?
- 2) Do this media have any space destined for the diffusion of the subject "water"?
- 3) Does your university have space in other media? Which ones? (Indicate its name)

<i>Media</i>	<i>Name</i>
<i>Television</i>	
<i>Radio</i>	
<i>Newspaper</i>	
<i>Others (Own publications, participation in specific meetings)</i>	
<i>Web (Blogs, etc.)</i>	

- 1) Is this space of easy access for the University?
- 2) Is it free?
- 3) Who is the sponsor of these publications?

C - Relation between Agencies and Media

- 1) *Presence of responsible people about normative in media*

<i>Media</i>	<i>Country</i>
<i>Television</i>	
<i>Radio</i>	
<i>Newspaper</i>	
<i>Others (Own publications, participation in specific meetings)</i>	
<i>Web (Blogs, etc)</i>	

Indicate for each agency:

- Tendency:

c: continued; s: sporadic

- Purpose:

i: informative; ed: educational; ex: explanatory

D - Do you wish to make any suggestion respect to this WP?

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