UNDP/GEF Kura Aras Project on

Reducing Transboundary Degradation in the Kura Aras River Basin

Regional Capacity Needs Assessment for Integrated Water Resource Management

January 2012

Executive Summary

Introduction

This document is the Capacity Needs Assessment for the UNDP/GEF Kura Aras Project *Reducing Transboundary Degradation in the Kura Aras River Basin*. It is the initial step in building capacity within the main water resources management organizations. It refers to capacities in each of the countries' abilities to manage water resources in the full meaning of the term, and specifically in the context of Integrated Water Resources Management (IWRM) within each country and within the context of transboundary waters.

The Consultation Process

Priority capacity needs were identified through an extensive consultation process. Workshops were organized in each of the three countries during November of 2011. Questionnaires on priority capacity needs were sent to participants prior to the meetings so that the participants could prepare themselves for the discussion.

Following the workshops, the IWRM Team prepared a set of detailed notes outlining the outcome of the workshops. A summary of their main points is presented in this document. Based on these, a list of priority capacity needs was prepared for each country. These were sent to the National Focal Points and the National Experts, who discussed the documents with team members and returned written comments. The priority needs presented in this document are the result of this consultation process.

Identified Capacity Needs

The priority capacity needs for each country were then summarized combined to determine common ground around which to base training and education programs as well as to identify priorities for the preparation of the National IWRM Plans. The summarized capacity needs identified are:

- Clarification of overall water resource management responsibilities
- Improvement of monitoring for water quality, water quantity and river ecology
- Improvement of information management for water quality and water quantity
- Improvement of protection of river ecology
- Management and adaptation for climate change impacts
- Improvement of public health through water supply and sanitation
- Economic instruments and incentives for improved water management
- Transboundary water management strategies and support in implementation

Capacity Building Strategy

The common prioritized capacity needs for IWRM (outlined above) provide the foundation for the development of capacity building efforts. An interlinked three-pronged approach is being developed:

The Kura-Aras IWRM Academy

1) To provide immediate training on IWRM related subjects through a series of nine short modules. These are intended for rising decision makers as a professional development opportunity. The training modules are:

- Introduction to IWRM – Why it matters and how it helps
- Water Quality Management – Assessment tools for better decision making
- Surface water and Groundwater Data Management – Permits, Planning and Information Management for use by Decision Makers
- Flood, Drought and Risk Management – Preparation essentials
- River Ecology and Environmental Flows
- Climate Change, Adaptation and IWRM
- Economics and Financing of Water Resources Management – The benefits of IWRM for economic development
- Gender, Public Health and Public Awareness – the human side of water management
- Policy, Law and Enforcement in IWRM – keeping the processes going

The training modules are currently being prepared. The first block of 3 modules will be given in April 2012, with the other two modules completed by October, 2012

Graduate Curriculum in IWRM

2) To improve capacity in the long term through working with Ministries and universities in the region and internationally to develop curriculum for a Master's Degree in IWRM.

The curricula are currently under development. They focus on both international best practices for IWRM and the specific needs for each country and for the region in its transboundary waters context.

National IWRM Plans

3) To improve capacity through addressing institutional and legal aspects of water management as part of the preparation of National IWRM Plans for each of the countries.

The National IWRM Plans are currently in development. There are three stages for the Plan development. Stage 1 is an analysis and critique of the current situation, covering institutional structure, stakeholders and legislative and policy environment. Stage 2 is an initial presentation of the Plans in draft for extensive stakeholder discussion. Stage 3 is finalizing the plans and preparing implementation schedules.

It is expected that the three prongs of this approach will be mutually reinforcing. In each case other international donor support is being sought to foster collaboration and maximum benefit to each country and the region.

Background

The long term development and environmental goal of the project is the enhancement of sustainable development of the Kura-Aras River Basin through ecosystem-based Integrated Water Resource Management (IWRM) approaches. The project objective is to improve the management of the Kura-Aras River Transboundary Basin through the implementation of a sustainable programme of policy, legal and institutional reforms and investment options using the Transboundary Diagnostic Analysis (TDA) and Strategic Action Programme (SAP) process. In order to achieve this objective, the project will update the TDA, support National IWRM plans which will be the base of the SAP, undertake a range of public involvement and awareness activities focusing on transboundary activities, and undertake demonstration projects that are anticipated in support of the forthcoming SAP

The Capacity Needs Assessment presented here refers to capacities in the countries' abilities to manage water resources in the full meaning of the term, and specifically in the context of Integrated Water Resources Management.

IWRM is a form of management. Like all management, it is developed for, and directed at, making decisions and implementing them. It requires a governance structure to make decisions and direct activities, and institutional capacity sufficient to carry out the directions of the governing body or bodies. In IWRM, governance refers to legislation, law and policy. Institutional capacity covers a wide range of disciplines which may be distributed among several ministries or other government bodies, and may be linked with associated non-governmental and civil society structures.

Like all management, IWRM requires good information for decision making and for implementation of policy and other directives. But monitoring programmes, management of data and preparation of information must be directed specifically at those needs.

IWRM is also about efficiency. Certainly this includes efficiency in water use, but it also includes financial and economic efficiency. Government spending on new approaches to managing water can be difficult to encourage, especially when changes are being made that will require higher levels of spending. Therefore it must be clearly shown that the additional spending results in overall savings to the government, and contributes positively to the Gross Domestic Product (GDP). It must also be shown that the institutions involved are as streamlined as possible - doing the most work for the least money. This requires elimination of duplication of efforts through reducing fragmentation and increasing integration of tasks; it requires the data gathering and information generation process to be specific and directed; it requires that the total water resources from all sources be managed as one; it requires understanding the link between water quality and water quantity as equal parts of the overall resource; it requires the support of policy and law and effective enforcement of those laws; it requires the right people to be involved in decision making and implementation, including women, civil society and other stakeholders; it requires understanding the environment of the land / water interaction so that correct management decisions can be made; it requires understanding the role of conservation of existing resources rather than always resorting to exploitation of new ones; it requires being prepared for what is to come rather than simply reacting to events, such as the impacts of floods and droughts and the risks of climate change. These are the main requirements to manage water resources efficiently and effectively.

The word capacity in this case refers to several aspects – not just training in technical aspects. It includes the capacity for developing a functional and efficient organizational structure for water resources management in each country and within the overall

transboundary waters environment. It considers Governance, institutions, budgets and others. It also considers training in specific aspects of IWRM, as identified through this Capacity Needs Assessment. The Capacity Needs Assessment is the first step in the National IWRM Plan preparation and implementation process.

This document identifies the priority capacity needs as developed through an intense consultation process. It then describes the common regional capacity needs, the strategy to address these needs and the training modules that have been developed based on the results of the consultation process. This briefly covers the preparation of National IWRM Plans which will be drafted nationally and linked regionally via the Strategic Action Programme.

The Consultation Process

During early November the project held workshops in each of the three countries to discuss the capacity needs for the various aspects of IWRM in their respective countries. A brief questionnaire had been sent out prior to the workshop so that the participants could prepare themselves for the discussion. Detailed notes from each of the workshops have been prepared by the project, with a summary of each presented here.

Following introductions, each of the meetings opened with a brief presentation giving the overview of the project to set the context of the meeting. This was followed by a training presentation on Integrated Water Resources Management and what form a National IWRM Plan may take, how it links with transboundary concerns and the EU Water Framework Directive, and capacity building and the capacity needs assessment. This insured that all participants were using common definitions for IWRM and were working form a shared foundation.

The remainder of the day was devoted to a discussion on priority capacity needs for the country, including how the country will respond to their responsibilities in the transboundary waters context based on regional and international agreements and shared interests in the EU directives.

Azerbaijan

In Azerbaijan, the meeting was held on 1 November 2011 in the Geography Department of the Baku State University. The participants were:

- Mutallim Abdullhasanov, Azerbaijan National Focal Point
- Farda Imanov, Azerbaijan National Coordinator
- Matanat Avazova, Water Quality Expert
- Khudaverdi Ganbarov, Microbiology expert
- Teymur Osmanov, Agricultural water use expert
- Rafig Verdiyev, IWRM Expert
- Elmira Mehdiyeva, Publicity/Social Media Expert
- Lyana Mammadova, Gender Mainstreaming Expert
- Ahmad Mammadov, Hydropower EIA expert
- Rustam Rajabov, Flood plain ecologist
- Vafadar Ismayilov, GIS Specialist
- Asif Verdiyev, Hydrologist
- Adishirin Alakbarov, Groundwater Expert
- Anar Nuriyev, Stakeholder Involvement Expert

- Mary Matthews, Project Coordinator
- Tim Hannan, Senior IWRM Expert
- Harald Leummens, Demonstration Project Coordinator
- Seiichi Sasaki, IWRM Coordinator

The discussion and follow up consultations identified the following needs for building capacity:

1) Clarification of Overall Water Resources Management Responsibilities and Appropriate Capacity Building:

At present, there is no organization in Azerbaijan that is responsible for the overall management of water resources, and establishing one is an obvious priority in National IWRM Planning. Which functions of water resources management will belong to which ministries or other organizations is also uncertain, as governance in the water sector is in a state of flux. Establishing an appropriate and effective water resources management structure must also be prioritized. The lead organization and others will then require supporting legislation through the Water Code and specific capacity building directed at taking on the various tasks associated with overall water resources management.

2) Improvement of Monitoring:

Improving all aspects of monitoring for water resources management was identified as a major concern in Azerbaijan, nationally and in the transboundary context. Limited budgets for monitoring equipment, staff, etc. necessitate thoughtful planning to identify monitoring locations and types to direct the monitoring work to decision making needs.

3) Improvement of Information Management:

Information management is closely related to monitoring but is broader. With water resources management it includes subject matter from other areas for which direct monitoring is not done, as well as activities in processing, analyzing and interpreting and presenting information to various users. The focus needs to be on modernization of existing networks and systems. Information management in the transboundary context should also be a focus.

4) Achieving Rational Use of Water:

Irrigation and the rational use of water are also major concerns in Azerbaijan. While irrigation is only one sector of water use, it is by far the biggest, overshadowing all other uses combined. Especially under the changing management structure of the water sector, it is important that this most important area of water use and water resources management be carefully considered and planned. Institutional structure, legal framework, capacity building needs, and others must be prioritized.

5) Improvement of Public Health Through Water Supply and Sanitation:

Services for providing domestic water and sanitation are poor in Azerbaijan. While much of the urban population has some form of a water supply infrastructure, most services do no function well and the water is not potable. With regard to sanitation, there are few functioning sewage collection and treatment systems. Raw sewage is dumped into rivers as a matter of common practice in rural areas. Institutional responsibility is established (AzerSu) but budgeting appears to be misdirected, legislative backing appears to be missing and

institutional capacity limited. Water supply and sanitation are mainly public health issues, making them civil society concerns in general and gender concerns in particular. Public awareness and gender mainstreaming are therefore primary tools for driving improvement, both of which are areas in need of concurrent improvement themselves.

6) Improvement of Protection of River Ecology

The lack of regulation in such areas as construction in protection zones and the destruction of the Tugai forests was raised as a priority. These are aspects of the larger picture of river ecology, environmental flows and regulations for protection and enforcement of those regulations. The various laws pertaining to river and watershed areas need to be reconsidered and enforcement mechanisms established.

7) Climate Change (with Management of Drought, Flood and Other Extreme Events)

Climate change and management through climate change adaptation are important concerns for the future and need to be addressed specifically. Especially with water resources management undergoing a major shift in responsibilities, addressing climate change specifically is important to ensure its management is not missed in the process. Climate change issues cross over into most other priorities listed here.

Armenia

In Armenia the meeting was held on 4 November 2011 in the UNDP conference room in Yerevan. The participants were:

- Volodya Narimanyan, Project National Focal Point - Armenia
- Hamlet Melkonyan, Climate Change Expert
- Astghik Danielyan, Microbiologist
- Hovik Aghinyan, Groundwater Expert
- Stepan Galoyan, Social Media Expert
- Gevorg Afyan, Agricultural Water Use Expert
- Lilit Harutyunyan, IWRM Expert
- Aram Gevorgyan, GIS Expert
- Lilit Simonyan, Gender Mainstreaming Expert
- Aida Iskoyan, Legal Expert
- Karlen Grigoryan, Flood Plain Ecologist
- Vilik Sargsyan, Municipal Water Use and Sanitation Expert
- Levon Chilingaryan, Environmental Economist
- Benyamin Zakaryan, Hydrologist
- Seyran Minasyan, Water Quality Expert
- Lusine Taslakyan, Stakeholder Involvement Expert
- Vahagn Tonoyan, Project National Coordinator - Armenia
- Mary Matthews, Project Coordinator
- Harald Leummens, Demonstration Project Coordinator
- Seiichi Sasaki, IWRM Coordinator

Through completing the new Water Code in 2002 and establishing the National Water Programme in 2006, Armenia has begun the process of developing an integrated approach to water resources management. Armenia has also adopted the river basin management principle through delineating six river basins and establishing Basin Management Organizations (BMO) in each. It is understood that the BMOs are not yet functioning as

water resources management authorities. To succeed the BMOs need to develop a range of water resources management skills, tools and links with other involved organizations.

The approach to a National IWRM Plan for Armenia will therefore work somewhat differently than for Azerbaijan and Georgia. However, the priorities for capacity needs raised during the consultation process were very similar to those of the other two countries:

1) Clarification of Responsibilities for Integrated Water Resources Management:

The concern pertains mainly to the BMOs, their role in managing the water resources of Armenia, what other organizations will be involved and how the BMOs will link with other organizations. Once those questions are finalized the specific capacities for each organization will need to be determined and a strategy for building specific capacities developed as part of the National IWRM Plan.

2) Improvement of Monitoring:

Improving monitoring in Armenia was a repeated concern during the consultations. This covered surface water, groundwater, water use and abstractions, water quality, river ecology and others. New approaches such as those which will approximate the EU WFD, including biomonitoring and other specific methods of monitoring need to become part of the overall water resources management of Armenia.

3) Improvement of Information Management Toward Effective Decision Making:

Information management is closely related to monitoring but is broader. With water resources management it includes subject matter from other areas for which direct monitoring is not done, as well as activities in processing, analyzing and interpreting and presenting information to various users. The focus needs to be on modernization of existing networks and systems. Information management in the transboundary context should also be a focus.

4) Economics and Financing of IWRM and Water and Ecosystem Services:

There are costs associated with provision of water services and of ecosystem services. There are also costs involved in improving water resources management in all its forms and working to achieve functional IWRM. There are also benefits, but these are often not well understood and decision makers need a reason to spend additional money. Economics and financing of water services and management need to be well understood, and protocols developed for their estimation and how decisions are made on the basis of them.

5) Managing Transboundary Aspects of Water:

While this is a National Plan, Armenia is a nation of transboundary rivers. The national plan must therefore include how the country and water managers should deal with the rights and responsibilities that the transboundary waters situation imposes.

6) Climate Change (with Management of Drought, Flood and Other Extreme Events):

Climate change and management through climate change adaptation are important concerns for the future and should be addressed specifically. Especially with water resources management undergoing a major shift in responsibilities, addressing climate change specifically is important to ensure its management is not missed in the process.

Georgia

In Georgia, the meeting was held on 8 November 2011 in the conference room of the Ministry of Environment Protection. The participants were:

- Marina Makarova, Georgia National Focal Point
- Tamar Gugushvili, Legal Expert
- Inga Kurtskhalia, Gender Mainstreaming Expert
- Nick Arevadze , GIS Specialist
- Ivane Tsiklauri , IWRM Expert
- Sandro Asatiani, Publicity/Social Media Expert
- Nino Gvazava, Stakeholder Involvement Expert
- Dima Kavtuashvili, Agricultural water use expert
- David Girgvliani , Groundwater Expert
- Baadur Ukleba, Hydrologist
- Medgar Chelidze , Hydropower EIA expert
- Nino Gagelidze , Microbiology expert
- Elina Bakradze , Water Quality Expert
- Marina Arabidze, Flood Plain Ecologist
- Zaal Lomtadze, Environmental Economist
- Medea Inashvili, Climate Change Expert
- Ilia Mtskhvetadze, Municipal Water Use and Sanitation Expert
- Marika Shotagze, Integrated Resource Management Project Manager
- Nino Kizikurashvili, Georgia National Coordinator
- Mary Matthews, Project Coordinator
- Tim Hannan, Senior IWRM Expert
- Harald Leummens, Demonstration Project Coordinator
- Seiichi Sasaki, IWRM Coordinator

The consultation process highlighted several specific concerns in governance and in institutional capacity, as listed below.

1) Developing an Entry Point and Generating an Internal Demand:

Concern was raised that there is little interest in adopting IWRM in Georgia and it will be necessary to build awareness of the need for IWRM over a broad spectrum of stakeholders. It will be necessary to develop an understood and agreed need for a National IWRM Plan in Georgia among the key decision makers and an awareness for the need for change among decision-makers and practitioners. One approach to this would be a tailored and directed training programme which explains what IWRM is, what an IWRM Plan is and why it is necessary. The recipients of this training need to be reasonably senior people, at a decision making level, or just below (those who may be decision makers in a few years' time).

A related point is to establish an "entry point" to decision makers, showing where the process of preparing a National IWRM Plan fit in with other, related initiatives that are already in progress. This would be a start to generating an 'internal demand'.

2) Clarification of Overall Water Resources Management Responsibilities and Appropriate Capacity Building:

While there are many ministries, agencies, etc. which are involved in water and its management, there is currently no organization in Georgia that is responsible for the overall management of water resources. Identifying such an organization to assume this responsibility in the future must be a priority in preparing a National IWRM Plan. If this agency can be identified early, its first task could be coordinating the preparation and implementation of the National IWRM Plan. In the future it will need to be established in law so that it is able to have a budget and full authority for water resources, at national and regional (rayon) level as well as at dealing with Georgia's responsibilities as a nation of transboundary waters. Georgia has already delineated river basins as management units, but they have not yet been functioning as such. Specifying roles for river basin management units as well as all other water resources management functions needs to be prioritized.

3) Review and Update Legislation:

The current water legislation in Georgia does not immediately support IWRM and needs to be revised in order to legitimize the basin approach and to support the adoption of IWRM. It must be comprehensive enough to reflect all the issues related to river basins and their management. New legislation should also be harmonized to support the adoption of the EU WFD, as has been recommended through several studies and documents. This is a challenge for the project, as creation of new institutions is beyond the scope of our immediate work. Therefore it may be necessary to find appropriate entry points within existing institutional structures as the legislation undergoes ongoing changes.

It should be noted that there have been previous recommendations for legislative amendments for improving water management made in other projects with little effect. Linking legislative amendments with specific aspects of water resources management through the National IWRM Plan may provide understanding and strength to the argument. In the future, the legal framework will also need to be streamlined as water management provisions are currently scattered over numerous legislative acts.

4) Responding to the Decline in Water Quantity and Availability including due to climate change:

While Georgia is not a water scarce country, declines in river flow and in the overall water resource in recent years prompts concern. With ongoing plans for major hydropower development, which will greatly affect the river flow regime, Georgia needs to be prepared and to plan for such impacts. The need for an effective water resources management structure is evident.

5) Improving Water Quality Monitoring and Data Management to mitigate deterioration of Water Quality:

Water quality has been in decline across the country, though with specific 'hot spots'. To reverse the decline in water quality a good understanding of how and why the decline is taking place is needed. This requires good base of information to be developed through well-planned and directed monitoring, data management and quantitative assessment and interpretation of data to develop the knowledge needed to tackle this problem.

6) Managing Transboundary Aspects of Water:

While this is a National Plan, Georgia is a nation of transboundary rivers. The national plan must therefore include how the country and water managers should deal with the rights and responsibilities that the transboundary waters situation imposes.

7) Climate Change Adaptation (with Management of Drought, Flood and Other Extreme Events):

Climate change and management through climate change adaptation are important concerns for the future and should be addressed specifically. Especially with water resources management undergoing a major shift in responsibilities, addressing climate change specifically is important to ensure its management is not missed in the process. The issue of climate change needs to be incorporated into the other priorities noted above, including in improvement of the legal base.

Follow-up Consultations

Following the workshops, the IWRM Team prepared a set of notes outlining the outcome of the workshops and summarizing their main points. Based on these, a list of priority capacity needs was prepared for each country. These were sent to the National Focal Points and the National Experts, who discussed the documents with team members and sent written comments. The lists above are the result of this consultation process. They represent the priority capacity needs for each country. These will be taken forward into the preparation of the National IWRM Plans and also form the basis of the nine modules presented below in the training component.

Common Capacity Needs:

The Capacity Needs Assessment workshops in each country revealed that there many common needs shared by the countries, though the specific details vary somewhat. These are summarized in Table 1 Common Capacity Needs Matrix. This matrix demonstrates the common needs for strengthening capacity for IWRM Plan development and implementation in line with international best practices and the EU Water Framework Directive.

Table 1 Common Capacity Needs Matrix

Common Need	Specific Need		
	Armenia	**Azerbaijan**	**Georgia**
Clarification of Overall Water Resources Management Responsibilities	Newly formed BMOs roles and responsibilities to be more specifically defined and capacity built	Shifting and unclear responsibilities for Water Resource Management	Shifting and unclear responsibilities for Water Resource Management
Improvement of Monitoring	Need improved water quality and quantity monitoring and use of information in decision making in line with EU WFD	Need to update for both water quality and quantity monitoring and use of information in decision making	Need improved monitoring and data management coordination and systems
Improvement of Information Management	Need to update how monitoring information and networks are used for decision making	Need to update how monitoring information and networks is used for decision making	Need for water quality management and water flow
Improvement of Protection of River	Valuation of ecosystem services	Lack of regulation, enforcement of laws	*Rated as a concern among some*

Common Need	Specific Need		
	Armenia	**Azerbaijan**	**Georgia**
Ecology	needed to support preservation	and regulations	*experts but not a top priority*
Climate change impacts management	Crosscutting and correlated with many priority issues in Armenia	Crosscutting and correlated with many priority issues in Azerbaijan	Decline in water quantity and flow availability, plus climate impacts
Improvement of Public Health Through Water Supply and Sanitation	*Rated as a concern among some experts but not a top priority*	Underdeveloped waste water treatment sewage and supply have significant impacts on human health	*Rated as a concern among some experts but not a top priority*
Economic Instruments and incentives for water management	Economics and financing of IWRM and water and ecosystem services for decision making	Need to include agricultural water use as this is the biggest user of water in Azerbaijan to achieve rational use of water	Need to inform Decision Makers and stakeholders about IWRM benefits
Transboundary water management strategies and support in implementation	Need information on how to deal with transboundary rights and responsibilities	Need support in monitoring and data management for transboundary impacts	Need information on how to deal with transboundary rights and responsibilities

These common capacity needs are:

- **Clarification of overall water resource management responsibilities**
  This need results from shifting legal and institutional structures for water management. As governments adapt to changing priorities, economic development and institutional evolution, management responsibilities for natural resources have also shifted resulting in unclear lines of responsibility and authority. This institutional evolution has resulted in increasing challenges and opportunities for IWRM plan development and implementation. In coordination with National Experts and government officials, and in collaboration with international organizations, the project team is currently endeavoring to develop stakeholder maps that provide an overview of the roles, responsibilities and lines of authority of each organization, institution, division, department and Ministry working within the cross cutting water sector. These will form a critical foundation for the IWRM Plans, and will be shared with the wider stakeholder community within the coming months for comments and clarifications. In some cases, there are very clear institutional points in which IWRM can be based. In other countries these are less clear. The project will endeavor to support the government to identify these points within existing institutional structures while providing support in development of these plans.

- **Improvement of monitoring for water quality, water quantity and river ecology**
  Improved monitoring of water quality and water quantity has been an ongoing capacity need throughout the region. This need is based on several aspects: new methodologies which have been slow to be adopted, unclear roles and responsibilities within organizational structures and institutions, lines of communications not being fully developed or used, and others. A priority is linking monitoring with information needs so that the information generation process is

efficient. Improvement of monitoring is an ongoing process and for regional water quality and water quantity standardization of monitoring it is of critical importance.

- **Improvement of information management for water quality and water quantity**
  Each country voiced a need to improve information management for both water quality and water quantity. The critical element in each case is how information is shared among stakeholders, and how useful it is for decision making. The regional standardization of information management related to water quality and water quantity has potential to improve water management integration both nationally and regionally.

- **Improvement of protection of river ecology**
  Sensitivity to the ecological role and value of water and river systems is acknowledged throughout the region, but implementation of river system ecology in order to support sustainable development is still needed. This has potential for benefitting the countries through economic valuation of ecosystems, improved support for protection of ecosystems, and potential for ecosystem restoration throughout the region. The understanding of complex river system ecology, as a functioning, dynamic biological system needs support in this region for meaningful sustainable development. This will also play a critical part in successful climate change adaptation at all levels from local to national to regional.

- **Management and adaptation for climate change impacts**
  Climate change impacts in the region are cross cutting, transboundary and critical. The countries are all working with the UN Framework Convention on Climate Change (UNFCCC) and producing communiqués and reports in line with the IPCC agenda. Water related impacts are critical and must be addressed both at the national and regional level. The need for this capacity building is clearly a priority in all three countries. Climate change impacts are expected to increase in severity in the coming years and decades with substantial impacts to human, social, economic and environmental costs. Among these impacts are increased flooding and droughts, increased heat waves leading to changes in soil conditions, and shifts in climatic zones. The countries are already experiencing these impacts and recognize that IWRM implementation may be a means to adapt to the changing conditions.

- **Improvement of public health through water supply and sanitation**
  While only Azerbaijan emphasized the need to improve public health through sanitation and water management, improving water supply and waste water disposal themselves were raised as needs in all three countries. As women are often those who carry the responsibility for family health and hygiene, including caring for those suffering from waterborne illnesses, especially the very young and the very old, public health has a critical gender component. Public health is also a clear avenue for raising public awareness about water, and for increasing capacity to change public behaviors through social marketing. IWRM seeks to integrate the public in water management, and as such this capacity need should be addressed by the project through coordination with other ongoing efforts nationally and regionally.

- **Economic instruments and incentives for improved water management**
  Water is a shared (common) good and its management financed through government budgets. Decision makers need to understand the costs of improving water management as well as its benefits and its value to society. All three countries expressed the need for economic evaluation of water management and of water resources themselves. The project will develop an economic evaluation methodology

for the region that is based on the costs and benefits of current practices and those of IWRM implementation, at both national and regional levels. Linking economic factors with the scientific information related to water management can support sound decision making critical for sustainable development. Water resources management also needs to be financed, raising questions of how it can be sustainably financed and what instruments can be used to do so.

- **Transboundary water management strategies and support in implementation**
  In each of the countries transboundary concerns were identified as a priority for IWRM planning and implementation. The upstream/downstream issues include flooding, pollution, ecosystem impacts, equity and river development plans including reservoirs, irrigation schemes and hydroelectric development. This will involve information exchange, joint monitoring and standardization, and clarification of rights and responsibilities of each neighboring country. This closely links with approaches emphasized by the countries from the EU Water Framework Directive, and enforcement of IWRM implementation in a coordinated manner. This project will address these concerns through the development of the Strategic Action Programme for the region, which will seek to support the harmonization of IWRM plans.

The regional capacity-needs have stemmed from national experts representing sixteen disciplines in each country with expertise and experience in water management issues. The international team served to facilitate the discussions and the workshops to prioritize these, however the commonalities of these concerns stemmed from the countries themselves.

Strategy to Address these Needs:

The common prioritized capacity needs for IWRM outlined above provide the foundation for the development of capacity building efforts. An interlinked three-prong approach is being developed. The first prong is development of training for practitioners of IWRM who will benefit professionally from a strong understanding of the theories and practices for successful IWRM. The second prong is the development of a graduate Master's degree curriculum for IWRM to be piloted by national and regional universities intended to fill future capacity needs for IWRM nationally, regionally and internationally. The third prong approach to meet capacity needs is to develop national IWRM Plans that will link together as appropriate to form the basis of the regional Strategic Action Programme that will serve as the basis for integrating water management across the region.

Train Practitioners through the Kura Aras IWRM Academy
The first prong is to provide training on IWRM for rising decision makers as a professional development opportunity. Training will be developed based on modules to address the specific capacity needs for practitioners who are and will be active in water management in each country over the coming two to three decades. The training modules are being developed to address these capacity needs and to place them firmly within the IWRM context. These modules will include:

Block 1 – IWRM Basics
- Introduction to IWRM – Why it matters and how it helps
- Water Quality Management – Assessment tools for better decision making
- Surface water and Groundwater Data Management – Permits, Planning and Information Management for use by Decision Makers

Block 2 – IWRM and the environment
- Flood, Drought and Risk Management – Preparation essentials

- River Ecology and Environmental Flows
- Climate Change, Adaptation and IWRM

Block 3 – IWRM and the human components

- Economics and Financing of Water Resources Management – The benefits of IWRM for economic development
- Gender, Public Health and Public Awareness – the human side of water management
- Policy, Law and Enforcement in IWRM – keeping the processes going

Draft outlines for the courses above are included in Annex 1

These courses will be offered in 3 blocks of 3 modules, in each of the 3 countries. The trainers for this will draw from project international experts and national experts, as well as academic institutions within the region to best address the national and regional concerns. All training materials will also be shared throughout the region via the internet. The training will be the foundation for the Kura Aras IWRM Academy – a web-based academy to serve as a regional and international resource that will feature related materials and information, plus serve as an institutional resource for data exchange and information sharing. Trainings will be done in April, May/June and September in each of the countries and will be open to members of intersectoral and interministerial organizations. The intention is to target rising decision makers and protégés of decision makers who will use IWRM approaches in their careers. It is anticipated that participants will be drawn from ministries focusing on issues of environment, economics and finance, agriculture, amelioration, hydrometeorology, social welfare and public health, tourism, emergency situations, industry, education, energy, natural resource management and others, as well as the academic sector. Participants will be selected based on nominations from the National Focal Points, UNDP Country Offices, and universities. Upon completion each participant will be presented with a Certificate of Completion from the Kura-Aras IWRM Academy, signed by all instructors, UNDP/GEF Kura Aras Project Coordinator and Ministry representatives (as agreed and appropriate.) Select participants in this training will be later recruited to provide inputs to the National IWRM Plans. Instructors will include Mr. Tim Hannan, Senior IWRM Expert to the UNDP/GEF Kura Aras Project, Eng. Ahmed Abou Elsoud, Senior BioMonitoring Expert and First Deputy Minister of Environment in Egypt, and Dr. Mary M. Matthews, Project Coordinator and Chief Technical Advisor, UNDP/GEF Kura Aras Project.

Curriculum Development for a Master's Degree in IWRM for National and Regional Universities

The second prong approach to address the capacity needs for IWRM is to work with Ministries and universities in the region and internationally to develop a curriculum for a Master's Degree in IWRM. This is needed for long term capacity development of IWRM for the region and internationally. This curriculum is currently under development and focuses on both international best practices for IWRM and the specific needs for each country and each region. It is envisioned that this curriculum will build on existing strengths within specific disciplines in the region such as hydrology, chemistry, engineering, and geography, and expand to include key elements of IWRM such as economics, ecology, pubic health, and policy planning. There are already initiatives within the governments of the countries to emphasize environmental education. This curriculum would serve to prepare IWRM professionals to work in a wide array of practices including agriculture and rural development, alternative energy development, environmental management, sustainable economic development, municipal planning and development and others. An initial presentation on this initiative can be found in Annex 2 of this document, which includes the

justification, objectives, institutional setting, faculty, students, program of study and graduation requirements for this degree.

The development of the Master's in IWRM would enable students from a wide range of disciplines to come together to study the theoretical and applied approaches to IWRM by taking a set of core courses, and then also taking courses in two areas of concentration. These proposed areas of concentration include:

- Climate change and IWRM
- Agriculture and rural development
- Ecology and IWRM
- Law and Policy for IWRM
- Sectoral Water Demands
- Public Health and IWRM
- Economics and Financing of IWRM
- Energy and IWRM
- Stakeholder Participation in IWRM
- Institutions for IWRM
- Advanced methods for IWRM

Students would also be required to complete an internship and a final project that analyzes a specific IWRM situation within the region, with proposed options to address the challenges.

The current discussions with Ministries and Focal Points, as well as universities in the region suggest strong support for this initiative. The curriculum could span all three countries with the faculties interlinked through Tbilisi and students offered the opportunity to study with peers from other countries. The faculties could draw from the region, where there is already strong foundation within specific disciplines for IWRM, and to strengthen the integration courses could be team taught by those from different backgrounds. Additionally, IWRM professionals from the region and internationally could be recruited to teach courses strengthening the practical applications of the degree and establishing professional ties for graduates.

The National IWRM Plans

The third prong of the strategy is the preparation of National IWRM Plans for each of the three countries. The identified capacity needs also serve as priority areas on which to focus in the preparation of the Plans. The Global Water Partnership guidelines, aimed at helping countries to prepare National IWRM Plans recommended that the best approach was to identify and select 5 or 6 priorities on which to focus the Plan, rather than try to solve all issues at once. This recommendation is based on the ideas that:

- it is too difficult to solve all problems at once and trying to do so will be overwhelming and may result in failure;
- achieving success in fixing a few priority aspects of water resources management will lead to an understanding of how to fix other areas, which can be accomplished later.

This has proven to be a good recommendation in countries that have already completed National IWRM Plans. Therefore, the National IWRM Plans prepared under the 'Reducing Transboundary Degradation of the Kura Aras River Basin Project' will be based on these priority capacity needs. They differ only slightly among the three countries and the lists presented for each country above also function as lists of priorities on which to focus the preparation of the National IWRM Plans.

It is anticipated that the three prongs of this approach will be mutually reinforcing. In each case other international donor support is being sought to foster collaboration and maximum benefit to each country and the region.

The nine modules described above provide key stakeholders with a strong foundation in all the primary issues in water resources management, and specifically in IWRM. These modules will take place during 2012 and will begin approximately concurrently with the preparation of the Stage 1 National IWRM Plans and they will be completed at about the time Stage 2 of the National IWRM Plans will be in preparation. Many of the same individuals taking the modules will also be closely involved in the preparation if the National IWRM Plans, providing good synergy between the two project components. At the same time, the curriculum is in development for the Masters Degrees in IWRM at universities in each of the countries. This will also be completed around the time of Stage 2 of the National IWRM Plans.

Conclusion:

The capacity needs assessment, conducted within each country across the region has demonstrated both a strong discipline based capacity for water management, and an awareness that additional efforts are required to improve water management through meaningful integration. The spirit of cooperation among national experts drawing from a wide range of backgrounds in response to the challenges of water management in a changing climate suggests that this is the right time to take steps to develop IWRM in each of the countries and across the region.

The hurdles faced by each of the countries are similar and suggest that there are far more similarities than differences between the countries within this region. Additionally, these hurdles, though significant, are not impossible to overcome. The specter of climate change and its water related impacts will require adaptation through robust institutional structures and a strong base of capacity within the region. As the Kura Aras Basin is blessed with rich natural resources, it also has strong human potential that will be the critical link towards sustainable development in the region through truly sustainable development at the local, national and regional level.

Annex 1
Training Modules Topics

The training modules have been developed in support of the preparation of National IWRM Plans in each of the three project countries. The goal of the training programme is to provide grounding to selected professionals from various disciplines of water resources management in IWRM and associated topics. The objective is that, with this background, the participants will be able to contribute to the preparation of the National IWRM Plans and, further, to establishing efficient and effective water management in their respective countries, and in the associated transboundary context.

The full course is made up of three blocks, each of three specific modules. Each is planned as a one-day, stand-alone, but related topic. Participants will attend all nine modules so that they receive the best grounding possible in a short time and be able to carry the lessons learned back to their own jobs.

Each of the topics has been developed based on the capacity needs determined through the consultation process as described above, and summarized into nine common topics. Each module also represents an important element of IWRM: what IWRM is and how it works, information and its management, stakeholders, gender mainstreaming and public involvement, economics and finances, law and policy, ecology and environment of rivers and watersheds, climate change and others.

Speaking to the transboundary nature of the project, the training is designed to be taken by experts from all three countries in the expectation that they will discover areas of common ground which will act as bridges in their work within the project and after its completion.

Together the modules make up the core aspects of IWRM and will provide the participants with a good grounding to progress into developing National IWRM Plans.

The modules are described in detail below.

Block One

Module 1: Integrated Water Resources Management – Why it matters and how it helps

Objective: It is critical to clarify what IWRM is, how it works when it works well and what institutions are needed to support it and sustain it. The objective of this module is to provide an overview of water resources management and to introduce IWRM as best practice in water resources management, including models of effective and sustainable IWRM in practice. The links between IWRM and development of EU WFD River Basin Management Plans will also be covered. Module 1 will include:

- Importance of water resources management
- Review of IWRM as a best practice approach to water resources management
- What is meant by “integration” and what they mean in practice
- How IWRM relates to the EU WFD River Basin Management Plans
- National IWRM Plans in a transboundary waters context
- Institutional requirements for water resources management
- Roles and responsibilities of the main stakeholder institutions in an IWRM process
- Specifically, the role of river basin management organizations in the IWRM process, relating international experience and its adaptation to South Caucasus region

This module will provide the foundation for the other modules and will serve as the common starting point for each country.

Module 2: Surface and Ground Water Quality Management – Assessment tools for better decision making

Objective: This module provides the critical link between water quality management and the decision making processes. Throughout the region considerable efforts and resources are put into monitoring water quality but the data generated is infrequently used for analysis leading to decision making or other uses in support of water quality management. This course is intended to create the link between monitoring and actions that will improve the water quality and river ecology. Module 2 will cover:

- Contemporary issues in surface and groundwater quality management
- How to understand water quality in the basin context
- Integrated management of surface water and groundwater quality
- Water quality management and land use and its management
- Political and economic influences contributing to water pollution
- Anthropogenic pressures on surface and groundwater resources and preventive measures in the Caucasus
    - Wastewater management and impact on surface and groundwater quality
    - Solid waste management and impact on surface and groundwater quality
    - Source and non-source effluents management and impact on surface and groundwater quality
- Designing monitoring programs for water quality management, what is needed in collection, assessment, interpretation, presentation, etc.
- The national and regional economics of water quality degradation and improvements
- Data to decision makers – what they need to know about water quality and why transboundary responsibilities in the context of the EU WFD

Module 3: Surface water and Groundwater Data Management – Permits, Planning and Information Management for use by Decision Makers

Objective: A primary concern raised in each of the countries was that the information chain, from monitoring to decision-making, is weak. It is apparent that there is not a strong link between monitoring surface and ground water quantities and water resources management. This course is intended to develop an understanding of the information chain, show how to plan monitoring programmes to specific decision making needs, and what data management procedures are needed between them. Module 3 will cover:

- Main issues in surface and groundwater data management in the South Caucasus
- Purpose of hydrological data collection – why you are collecting this information
- Contemporary issues and mechanisms for collecting and managing groundwater data
- Data management and presentation and current practice in IWRM, EU WFD, etc.
- Surface and groundwater cadastre and issues of water data management
- Developing a robust permitting process that can improve water management effectiveness
- How to present data to water resources managers and decision makers and how it informs the water management process.
- GIS as a tool for storing, analyzing and managing water quantity data

- Institutional considerations for information management: information sharing for integration
- Information needs for transboundary concerns
- Information needs for climate change considerations

Block 2
Module 4: Flood, Drought and Risk Management – Preparation essentials

Objective: Considering floods and droughts in the context of risk is the modern approach to their management. In the South Caucasus region, dealing with flood and drought tends to be 'reactive', treating them as disasters after the fact, rather than planning for them in advance to offset their severity or mitigate their impacts on the society, the economy and the environment. This module covers actual management of floods and drought that includes risk assessment and risk management. Module 4 will cover:

- Planning and management in the context of floods and droughts
- Risk assessment and risk management
- The nature of floods and anthropogenic impacts on them
- The causes of droughts and anthropogenic impacts on them
- Flood prevention: structural, watershed management, etc.
    - Flood risk mitigation: flood risk mapping, early warning, zoning, insurance, etc.
    - Mudflows, their impacts, managing floods in the context of mudflows
- EU Flood Directive
- Assessing risk in the context of floods and drought
- The economics of disasters and risk management
- Drought risk mitigation: planning, water security, food security, etc.
- The role of spatial databases in disaster risk reduction
- Decision making mechanisms in disaster risk reduction
- Flood frequency, drought severity, and level of damage increasing with climate change impacts

Module 5: River Ecology and Environmental Flows

Objective: The practice of managing water resources at a river basin level is a new concept in the region. Recognizing the link between managing water resources and managing the health of the river basin is also a new concept. As the region moves toward implementing IWRM and adopting principles and practices of the EU WFD, it is important for those in the field of water resources management to be clear about how water resources and the ecology of the river basin are connected. This module provides a background into how the basin approach is implemented. Module 5 will cover:

- The relationship between river basin ecology, river flows and water quality
- Defining the concept of environmental / ecological flows
- Anthropogenic impacts on river flows and the economic and social aspects of environmental / ecological flows
- Wastewater and solid waste management and impacts on river ecology
- Minimum environmental / ecological flows and their value in river basin management
- Importance of the ecosystem approach in setting environmental flows
- Methods for establishing environmental / ecological flows based on hydrology, water chemistry, biodiversity, etc. and their comparative advantages and disadvantages
- River restoration in the context of environmental / ecological flows

- Deterioration of watershed ecology, river ecology, water quality, decline in water quantity
- Potential worsening of the above through climate change
- Transboundary responsibilities, especially in consideration of links with the EU and the WFD

Module 6: Climate Change, Adaptation and IWRM

Objective: Climate change is one of the biggest concerns of our time and improving the way water resources are managed is one of the most important means of adapting to it. Through the work of the UNFCCC, the countries of the South Caucasus have assessed the impacts of climate change for their regions and have developed good understanding of them. However, adapting to climate change remains relatively weak in the countries. Partly this is due to lack of planning in most areas and knowledge of the role of risk assessment and vulnerability and risk management with regard to climate change. This module covers the impacts of climate change in the water resources and river ecology context and introduces climate change adaptation considerations and methods as part of the planning and management process. Module 6 will cover:

- What are likely climate change impacts on the water sector and on river basin ecology and predicted climate change scenarios for the South Caucasus region
- UNFCCC, and EU WFD River Basin Planning in a Changing Climate
- Climate change and assessment of risk and vulnerability
- Adaptation strategies in the water sector and the concept of “no regrets”
- Socio-economic impact of climate change and cost/benefits of climate change adaptation
- Climate change, risk assessment, and vulnerability in development of water resources adaptation measures as the main direction of functions of IWRM
- Considerations of climate change, in water resources planning and management
- Potential impacts of climate change on water quantity and quality, general and specific to South Caucasus
- Potential impact of climate change on river basin ecology, general and specific to South Caucasus

Block 3

Module 7: Economics and Financing of Water Resources Management – The benefits of IWRM for economic development

Objective: Improving water resources management has both costs and benefits in the financial and economic senses. Improving water resources management is therefore often a ‘hard sell’ to government decision makers because there is an understanding that there will be associated costs, but there is limited understanding of the benefits. Improving water resources management is therefore seen simply as an additional cost. The same is equally true of environmental management and ecological improvement. Environmental economics and the economics of water are relatively new disciplines. These are both complex subjects, and this module is intended to develop an initial understanding of the economics and financial aspects of water resources management. Module 7 will cover:

- Development history of water resources and environmental economics
- Water as an economic and social good – what does this mean?
- Water resource allocation from economic and social perspectives

- Economic instruments in ecological improvement and environmental management
- Evaluating the benefits of improved water resources management, especially through IWRM
- Assessing the impact of economic activities on water resources
- Assessing the value of water and services provided by water, including supply and demand equations and producer and consumer behavior
- Economic instruments and the impacts of improving water use efficiency, water charges and tariffs, etc.
- Policies on management, use and financing of water resources
- Water finance and innovative financial mechanisms for IWRM – how to pay for improved water resources and river basin management
- Transboundary responsibilities, especially in consideration of links with the EU and the WFD

Module 8: Gender, Public Health and Public Awareness – the human side of water management

Objective: Public health is always a priority concern in water resources management. Gender specific issues are also prioritized due to the gender distribution of care taking duties for those suffering from water borne illnesses and in family sanitation. Public awareness is also a key factor in this link, and gender and participation are both principles of IWRM. Linking public health to IWRM is a means of arguing for its implementation. This module highlights gender issues and public participation and how they link with IWRM and its implementation within the context of public health. Module 8 will cover:

- How IWRM links with public health through domestic water supply and sanitation
- How IWRM links with gender
- How IWRM links with public awareness
- Economics of public health in the IWRM context
- Water and health risks (waterborne diseases, health and access to sufficient water supplies, etc)
- Water, health and vulnerable groups
- Gender importance: economic benefits, benefits to children, empowerment of women
- Gender mainstreaming in water, sanitation and health and its implications in water resources management
- Building public awareness about public health and mechanisms for public participation
- IWRM as a mean to ensure good public health

Module 9: Policy, Law and Enforcement in IWRM – keeping the processes going

Objective: Implementing IWRM requires change, especially in what public institutions do, and in which institutions have responsibility for the various aspects of water resources management. It also requires change in how these institutions work, what budgets are required, etc. Most of these changes, and the establishment of responsibility, require legal backing so that new approaches and regulations can be enforced and also so that budgets can be obtained for doing their work. For much of the South Caucasus region, water policies are not in place (though there is currently work going on to develop them), water laws are insufficient to support water management in general, and specifically IWRM and EU WFD changes. There is a hierarchy of policy, law, regulations, budgets and activities which are not fully understood in the context of water resources management and, specifically, in implementing IWRM and moving toward adoption of EU WFD principles and methods. Where specific laws are in place, such as those which cover Environmental Impact

Assessment for water abstraction permits and effluent discharge permits, there is often not a functional means of ensuring compliance with those permits or enforcing the laws. This module will provide a foundation in the legal, policy and enforcement aspects of IWRM. Module 9 will cover:

- The role of law in water resources management, specific to IWRM
- The relationship between law and policy in IWRM
- Water abstraction permits and mechanisms for enforcing compliance
- Environmental Impacts Assessment of Water Policies
- Post Decision Monitoring and Management.
- Water governance and institutions: dimensions; principles of effective governance, the role of governance in IWRM implementation
- Policy and law in the transboundary waters context (including rights and international obligations related to transboundary waters)
- Transboundary responsibilities within IWRM and the EU WFD

ANNEX 2
PRESENTATION TEXT:

Recommendations for:
Master's Degree Curriculum for Integrated Water Resource Management
(MSc in IWRM)

Dr. Mary M. Matthews
UNDP/GEF Kura Aras Project

Overview

Justification
Objectives
Institutional Setting
Faculty
Students
Program of Study
Core Courses
Area Courses
Graduation Requirements
Needs and Next Steps

Justification:

Gift of the Caucasus is the natural beauty and plentiful resources, but human development has altered natural systems

Natural Resource Management in the region needs to be integrated in order to be sustainable

Climate change requires adaptation, IWRM is key to survival in the region, and new generation needs tools to address new conditions

Objective:

To provide *analytical skills and tools* to the future generations of decision makers to apply the principles and applied practices of Integrated Water Resource Management (IWRM) taking into account the *current and future challenges facing the water sector* including the potential *impacts of Climate Change on water resources availability*

Demand:

Prospective employers of graduates:

- Ministries
  - Environment
  - Energy
  - Industry
  - Agriculture
  - Public Health
- Basin water management organizations
- Municipal Government
- International Organizations
- Environmental Engineering Consulting and EIA Firms

Institutional Setting:

Draw on faculty from main universities both in the country and across the region
Link with universities offering similar degrees in region*
Link with other universities in Europe, the US, etc.
Use distance learning as a tool for collaboration and additional courses
International field-of-practice organizations GWP, IW:LEARN, INBO, etc.

Faculty:

Draw on existing faculty at local universities wherever possible
Applied practitioners of IWRM drawing on national, regional and international bodies
Team teaching of courses
Core Courses and Area of Concentration courses

Be Flexible

Prospective Students:

Hydrology
Geology
Civil Engineering
Ecology
Biology
Chemistry
Geography
Sociology
Public Administration
Political Science
Economics
Forestry Management
Agriculture Science
Public Health
Natural Resource Management
Hydro-geology
Environmental Science
Etc.

Program of Study:

Prerequisite: Background in basic physical science and social sciences
Including: chemistry, biology, statistics, political science, macroeconomics
Or professional experience
Core Curriculum – required of all
Areas of Concentration – 2 areas required
Additional Graduation Requirements
Professional Certificate Option

Core Courses:

Introduction to IWRM – Physical & Institutional Aspects
Water Quality Management
Water Quantity Management, Allocation and Conservation
River System Ecology
Monitoring and Information Management for IWRM
IWRM Decisions and Economics

Areas of Concentration:

Climate Change and IWRM
Agriculture and Rural Development
Ecology and IWRM
Law and Policy for IWRM
Sectoral Water Demands
Public Health and IWRM
Economics and Financing of IWRM
Energy and IWRM
Stakeholder participation in IWRM
Institutions for IWRM
Advanced methods for IWRM

Graduation Requirements:

Core Courses
2 areas of concentration
Internship
Final Project with Analysis of IWRM Issues
Publication of IWRM related articles

Needs and Next Steps:

Establish exploratory committee
Identify interest of prospective employers in public and private sector
Identify interest of universities
Identify interest of potential students
Identify further funding sources

Conclusions:

Need for IWRM Implementation Practitioners
Growing need for capacity and tools in the region
Strong foundation for water management in Kura Aras Basin
Need to integrate these disciplines in order to maximize benefits for the people and environment of the region

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(additional slide)

Potential courses for each Area of Concentration

Climate Change and IWRM – meteorology, climate change, oceanography courses
Agriculture and Rural Development – soil science, irrigation management, crop management
Ecology and IWRM – ecological biology, ecostatistics, botany, zoology
Law and Policy for IWRM – comparative, international, EU law and policy, transboundary IWRM issues
Sectoral Water Demand - courses based on sectoral specific water uses
Public Health and IWRM – waterborne disease, social marketing, disease vectors, sanitation management
Economics of IWRM – economic valuation of water, water resource economics, sociopolitics of water resources, Cost Recovery and water tariffs
IWRM Management Enforcement - - Environmental Impact Assessment, Law enforcement principles, Strategic Environmental Assessment
Energy and IWRM – hydropower development, hydropower (Need more courses on hydro power for the region)
Stakeholder Participation and IWRM – stakeholder analysis, social marketing, gender mainstreaming, sociology of development
Institutions for IWRM – International Organizations, environmental enforcement, EU Water Framework Directive
Advanced methods for IWRM - Alternative water sources, alternative irrigation and water reuse strategies, alternate sanitation and WWT methods