

Climate change and water resources issues

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The recent intergovernmental panel on climate change (IDCC, 2007), highlight clearly that water is the medium through which climate change acts out upon livelihood, economic and environment.

Indeed, climate change is felt first through water because of drought, floods, storms, melting ice and sea-level rise.

To date, much attention has been focussed on the dimensions of temperature and sea level rise. Substantial work has also been done on some of the consequences, such as change in rainfall and the risk of more and more intense floods and droughts.

However, not nearly enough work has been done to understand how to cope with the potential impact of climate change on the water environment at a regional, national and local level (5th WWForum, 2009).

What should be clearly kept in mind is that if the challenges of climate change for the world's water are not understood and addressed, we run the risk that water supplies we provide to the communities of a growing urbanizing world, the infrastructures we build to serve them and the industries and agriculture that supply and feed them, will prove to be unsustainable.

Adaptation efforts must begin immediately, unless we act now, we will miss opportunities to make it easier to ensure a more sustainable long term future. An approach to water resources management that can identify and address the challenge -and uncertainties- is needed.

Water being the primary link between the climate and the human system, it is, therefore, at the centre of adaptation. However, before discussing this issue, there are several key problem statements, those can be possibly expressed in the following questions, including:

- *Governing arrangements*

Is water a high enough priority in adaptation policies and plans and what does that mean for governance and decisions-making?

Is adopting and implementing best practices in water management a step forward in coping with climate change?

- *Planning for adaptation*

Are tools and information available to plan effectively for adoption?

How to better plan for adaptation?

What needs to be included and integrated across sectors?

- *Local actions*

What are the pro's and con's of response options? And how can or will local climate adaptation be done in practice?

- *Financing adaptation*

Is there a need for additional finance? What are the blockages to effective financing for adaptation? And what are the response options and how should be accomplished?

Finding a reasonable solutions to the abovementioned key problems is not an easy process, however, as far as, the concern is climate change adaptation in water management and services, experiences gained and learned lessons are giving more emphasis to several issues.

Water should be made a high priority in policy and planning for adaptation in order to reinforce and strengthen the resilience of water system and make responses to water crisis more effective. Equally, this will result in generating multiple benefits across sectors, hence, this implies looking outside the water box and across sectoral borders.

Efforts ought to strive towards «best practice» in operation and maintenance in combination with demand management for poorly operating water system. Indeed, this can be a big step towards adapting to climate change

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by making such water systems more adaptive and resilient.

A crucial issue for climate change adaptation is the local actions. Adaptation, vulnerability, mitigation and the multiscale and multidisciplinary challenges associated with climate change impacts can only be tackled by broadening the portfolio of response options on a local level.

That is a practical and realistic approach to be followed to help water resources managers and water service managers to adapt successfully to global and climate induced changes in the water resources.

Although the general shape of the future climate change is increasingly clear, there is still substantial uncertainty about the climate that will be experienced in different parts of the world. The broad picture of global warming is reasonably well understood and there is growing agreement about its regional dynamics and scale. Regarding the rainfall predictions, at present, they are relatively general and are indicative rather than definitive (IPCC Report Summary, 2007). Being difficult to make good predictions about the future of rainfall storms, it is undoubtedly true that to predict the impact of changing temperature and rainfall on water availability is to be more difficult. That is why moving from temperature prediction to reliable predictions of local rainfall, its distribution and the resultant river flow is a huge step forward.

The water related extremes are increasing and are likely to be more frequent and higher in magnitude under the changing climate. Nowadays these extremes are posing a great challenge to the human society in terms of looming food crises, pressure on natural resources, loss of livelihoods and in loss of life.

Disaster risk reduction should be factored into policies, planning and programming related to sustainable development, relief rehabilitation and recovery activities and, above all, should be fully understood under the changing climate. In areas where climate change is felt, it is vital to have not only a reliable projections of various climate change scenarios but, also, the way these scenarios would impact the hydrological cycle.

There are multiple challenges confronting many countries around the world to mitigate successfully to climate induced changes in their water resources. However, addressing such challenges requires addressing not only the scientific and engineering aspects but, al-

so, the social, environmental, economic and legal and institutional aspects. Aware of that, the integrated approach being multi-sectorial and multi-disciplinary provides a suitable framework for water related risk management under IWRM through policies and strategies where a combination of hard infrastructural and soft institutional measures are in practice.

Indeed, both measures are involved in the IWRM, beside the fact that it addresses a set of soft tools that are often cheaper and, in some cases, could be more effective than its infrastructural tools. Such tools provided by the IWRM are offering many countries a better chance of coping successfully with climate variability and change. However, this requires that various stakeholders and players to play their part according to their experiences starting from planning to implementation. Equally, for successful adoption and implementation, most countries are in need to an appropriate knowledge base on water resources and climate change, institutional mechanisms and management systems to coordinate responses and support difficult decisions, funding the actions required and most of all with a close cooperation and collaboration at global, regional and national levels.

To conclude, at present many countries are already promoting and implementing IWRM, according to the decision already taken at the 2002 World Summit on Sustainable Development concerning that all countries should establish integrated water resources management plan by the year 2005. The presence of this framework should be used to address the challenges of climate change in a structured way. For this to be realized complementary assistance is needed not just to support climate change adaptation, but to ensure that water resources managers, particularly in poor countries, are equipped and helped to use the new tools and more efficient technologies to manage their water resources under the climate change risks to compensate for the lack of resources that might tempt them to rely on more traditional, hardware solutions.

The observations and research findings demonstrate that the IWRM systematic approach with its variable tools has already proved to be useful for climate change adaptation. Therefore, to ensure the water management sustainability much more work is needed that helps to mainstream adaptation into national development plans.