

An Interview with Experts on the Comprehensive Assessment of Water Management in Agriculture

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The scope of the *Comprehensive Assessment of Water Management in Agriculture*

The Comprehensive Assessment of Water Management in Agriculture (CA) has just published a book entitled "Water for food – water for life", an impressive volume on the present state of global water use and the many challenges we will be facing in future. The book presents the results of 5 years of work, and 700 experts were involved in its making. What are the main messages? Who is the main target group?

David Molden (DM): When thinking about the past and looking towards the future, this is the key message: We have to change the way water is managed. There are three main reasons why – one is in order to better support livelihoods, and the second is to do a much better job of conserving the environment. A third reason is the world population's enormous need for food production and the consequences this has on water use. Key decisions must be made on water management now and for the next 25–50 years.

The book's primary target audience is decision-makers and investors in water management in different countries and at different levels. There are recommendations for other levels as well. Farmers and fishermen, for example, invest a lot in water for food, but the messages need to be translated for them and disseminated through different channels.

Julie van der Bliet (JB): One purpose of the book is also to bring everybody up to standards and to attain a common understanding of crucial water management issues. While the summary is really targeted at policy-makers, the wealth of information in the body of the book is also meant for academics and students, for research institutes such as IWMI or the Challenge Program on Water and Food, and for international donors.

The past year – the year of the 4th World Water Forum in Mexico – has seen the publication of several reports on water and the global water crisis: the 2nd UN World Water Development Report 2006, the Report of the World Water Forum in Mexico, and the UNDP Human Development Report 2006 entitled "Beyond scarcity: Power, poverty and the global water crisis". In what respect is your book different from these reports?

DM: This book is specifically on water for food, whereas the other reports take a broader view on water resources with a limited coverage of food production. This broader perspective is necessary, but the major driving factor behind water scarcity and environmental degradation is water for food. The livelihood implications of water and food are substantially underestimated compared to drinking water and sanitation, which is, of course, important. There is a serious need to look at the issues of water and food specifically, which is not adequately done in the other reports. The group that worked on this book also contributed to the UN World Water Development Report and provided considerable input for the UNDP Human Development Report.

Areas of conflict and the issue of power relations

According to Integrated Water Resource Management (IWRM), challenges in water management can no longer be approached from a sectoral perspective. Did you take account of water use in the other sectors, as well?

We looked at water for food from an integrated perspective, and all of our scenarios for the future consider the water needs of cities, industries, the environment and of course agriculture in an integrated manner. One of the interesting insights is that policies outside the water-for-food sector often have a great impact on water availability for food production. Reallocation of water from food production to other uses, especially to the cities, is an important issue, and there is a serious but silent conflict between water for food and water for the environment.

How did you estimate the water needed for the environment?

There is a separate CA report on environmental water stress which gives a rough estimate on a global scale of minimum flow requirements that was used in developing scenarios. However, we recognise the need for improved basin-by-basin and country-by-country estimates. Especially in regions where water is physically scarce and population pressure is high there is clearly not enough flow to sustain ecosystem functions. This is true for the basins of rivers like the Yellow River, the Indus, but also the Colorado in the US and the Murray Darling in Australia. The phenomenon directly affects 700 million people around the globe and is by no means specific to the developing world. Furthermore, there are quite large "bread baskets" among the affected areas. The issue of negotiating water allocation taking into account environmental flows is becoming increasingly important.

Do we really know enough about the complex linkages between minimum flow and ecosystem services?

No, we do not! There is a need for much more research. One of the crucial topics is environmental flows. Ecologists and hydrologists are jointly trying to understand how flow patterns affect the environment and how ecosystem services can be maintained at a reasonable level. The difficulty is to make the link between environmental and other uses in a river basin context, and determine what can be done in agriculture to release the necessary environmental flows and to negotiate these trade-offs. This is a complex task especially in river basins that are already overstressed. In these areas people have existing water rights, and reallocating the water means taking these rights away and giving them to somebody else.

If you had to choose between diverting water to your rice paddy in order to feed your children or leaving it in the river in order to sustain the environment, what would your choice be?

I would bring it to the rice paddies – that is the only choice for many smallholder farmers. But that is exactly where the conflict starts. If I do, fishermen downstream will no longer have the same choice.

What options are there to solve this conflict and regulate water use?

In a basin context it is important to take account the voices of different groups of people who have a stake in water. Fishermen and farmers for example do not necessarily communicate. We suggest that platforms be set up where people can communicate. However, that alone will not do. Governments must be supportive in policy negotiation, and more baseline information is needed in order to better understand the trade-offs.

But negotiations are a matter of power. The world we live in is not ideal, some people are more powerful than others. How can they be prevented from taking all water for themselves?

The question of power makes everything more complex. Sometimes outsiders can step in and try to equalise the game by pointing out these issues. Bringing in governments or launching a political debate helps, as well, but it will often require some serious coalition building to balance such power.

Is it really only power? Is it not crucial also to discuss the aspect of values?

In water for food it was traditionally the value of the crops that reflected the value of water. Today people have begun to take into consideration the value of water in providing for different ecosystem services and this no longer consists only of the economic value. It can include cultural values and values attributed to groundwater recharge, fisheries, or biodiversity. But there are differences in how people value these services.

Claudia Sadoff (CS): If you consider nothing but the economic value, things can look rather distorted. One of the highest economic returns of water in the US is found in Las Vegas (tourism, gambling). Nonetheless, economics is one way of rationalising the use of a scarce resource and reaching a more effective use.

Does this mean that sorting out water use and allocation can be left to the economists?

CS: Absolutely not, especially in view of the fact that the global agricultural market is incredibly distorted. Simple changes in the subsidy systems can give completely new signals to the producers and shift water allocation to activities that produce higher gains under the changed subsidy system.

So the challenge is how to introduce sensible subsidies that set the signals in the right direction?

CS: This is where the politicians come in. But their decisions can be influenced by the work of scientists like those who worked on the Comprehensive Assessment.

JB: Much has to do with information, as well. Many people simply fail to realise how much water it takes to grow our daily food. Market distortions and international trade agreements do not consider the water aspect appropriately. But if the relevant information is provided and the impact of agriculture on the water cycle explained it may be taken into account in the future. This is an essential function of the book – to bring this information to the right people. If people start thinking differently about water, change can happen.

Drivers of change in water use

Recently climate change and the potential of biofuels and their effect on carbon emissions have been the subject of public debate. Did you consider that in your scenarios of future water use?

DM: We did carry out some studies focusing on India and China – countries that on the average are already experiencing physical water scarcity – there would not be enough water to grow the amount of biofuel crops they would require. Of course this discussion is also highly political and related to trade and national self-sufficiency in energy supply.

After 5 years with the CA, what was the most striking surprise for you?

The biggest surprise came from our livestock colleagues. Initially we did not have a chapter on livestock, but then we realised how much water is needed for meat production, and after all, livestock is extremely important for livelihoods in sub-Saharan Africa. So the first message was that if you look only at the environmental angle, you will miss many livelihood values that livestock has. Animals in Ethiopia are like a walking bank account, a way to cope with drought, they are more than just beef – there is the ploughing, the transport power and some other values which we realised were totally underestimated. Then we became more interested and began to examine livestock practices and look for ways to increase the value per unit of water and to save more water in livestock production.

So there is a need to differentiate between integrated livestock systems in semi-arid areas and industrialised meat production in developed countries?

Yes. That is the real issue – the water issue of corn-fed cattle that use so much water is completely different than the set of issues around grazing goats in Africa.

Livestock and meat production brings us to food diets. Can we influence water demand by what we eat?

Yes, you are absolutely right, diets do influence water use. Just think about how much water it takes to produce what you eat. It is not just the growing of our food that uses water – around 40% of the total amount required for production actually goes lost somewhere between the farm and the fork. Some of it is even wasted right in our own house – just think of what we throw away. So the goal is to save water both on the farms and along the whole food chain.

Another insight that took us by surprise (of course we are water management specialists and normally focus mainly on water) is that the main influence on water consumption is exerted by everything else around water, and that these are the things that can make the big difference: the diets, biofuels, trade, and the subsidies.

CS: It is the combination of the shift in diets and the increasing production of biofuels that will make the situation even more critical.

Let us then have a closer look at the drivers of change in water use. The ecosystem assessment distinguished between direct and indirect drivers. Are the indirect drivers the most important ones?

DM: Considering the impact on water resources, yes. Water managers often respond only to the direct drivers. For example, if cities require more water it must come out of agriculture, farmers must save water and we can provide the technologies and practices to do so. But we always risk forgetting the big picture. It takes a thorough understanding to determine what is of real importance and how to influence that rather than just responding to a current or local constraint.

Pathways for more efficient water use: The new focus on rainfed areas

Changing consumption patterns is something that each individual can do, especially in the developed world.

In the Comprehensive Assessment the improvement of productivity, especially water productivity in rainfed areas, is identified as one very promising solution. Today there are some signals that production can only be increased and poverty reduced if land is aggregated into bigger farms. Will smallholders loose out when we take into account the recommendations of the Assessment?

Undernourishment and income generation are critical concerns, especially in sub-Saharan Africa. The problem is how to kick-start development and economic growth through agriculture, which is often the main economic activity of 80% of the population. Diversification into other jobs or an increase in farm size are some of the possibilities for the future, but for many smallholders rainfed agriculture is the only option in the short term. Irrigation was a big driver of development in India or China, but the majority of the rural poor depend on rainfed agriculture. There could be a possibility to double irrigated area in sub-Saharan Africa using larger scale irrigation, but it is very difficult to reach the rural poor quickly using this strategy alone, because the irrigated area is so small now that doubling only means a small increase. It is therefore important to look at rainfed agriculture, where water management and soil and water conservation can have an important impact. In many semi-arid areas there is enough rain throughout the year, but its distribution is not ideal for crop growth. One way of reducing the risk of drought is to store some water for supplemental irrigation during dry spells. Another method is to use a minimal amount of fertilizer to boost crop establishment and maintain soil fertility. We think there is an unexplored potential for upgrading rainfed agriculture, provided that it is done in an integrated way. However, no investment will work by itself, it always needs to be integrated with the markets. This is one of the important messages in this report. People usually think about water and agriculture in terms of large-scale irrigation and water storage, which is important, as well; but small-scale actions on rainfed land can help people overcome dry spells and be a lot more productive.

In semi-arid areas rain is unpredictable. Risk will always be high, and the yield gap exists precisely because of this risk.

Water storage – which, of course, has a cost – is a way of managing risk. Water can be stored directly in the soil through water harvesting, or in small-scale surface tanks. Underground water storage is difficult in

sub-Saharan Africa. In some places it is possible, but Africa lacks the well-developed alluvial fans and the groundwater potential found in Asia for example.

CS: An important factor related to rural development is the sequencing and scale of activities. There is a new readiness to revisit integrated area development. Increasing farm size is not the only way to reach an economic scale that enables farmers to access irrigation or markets. One alternative is for small farmers to cluster spatially, in order to reach a critical mass. However, they also need market infrastructure, such as roads by which they can reach the markets. Without road access it is not possible to produce for the market. Storage is another issue in areas with high rainfall variability: usually the year is not bad everywhere, so even in years when harvests are poor, some farmers will have crops to sell. Food fluctuations can be smoothed by storing this produce for trade between surplus and deficit regions, of for sale in the next season. Roads and grain silos can help reduce risk, but these measures require regional planning and are beyond the influence of individuals. This example shows that we need to broaden our scope – when you are thinking of ways to increase water efficiency, you do not necessarily think of roads.

In the seventies there was already a strong emphasis on integrated rural development. Time revealed ambivalent results.

Yes, but most often these programmes were externally imposed and centrally planned without involving the local people and without taking into account their livelihood needs, values and preferences. If we consult the local population, if we understand ecosystem functions and the social structure, and if we know the priorities of the local people, rural area development can be achieved to the benefit of the local people as well as the environment.

Infrastructure is quite expensive. What is the cost-benefit ratio of such investments – can improved rainfed farming alone pay the costs?

No, probably not. Some level of public investment in infrastructure is likely to be a prerequisite for moving away from subsistence agriculture and providing the security necessary for people to invest in commercial activities – which, in turn, is necessary for rural development. Most macro-economic planning models consistently underestimate the returns to agriculture. Their estimates are based on average years, but given the fluctuations in rainfall, reality rarely corresponds to these conditions. The cost-benefit ratio of this type of investment is much more favourable than our models had led us to believe, because rainfall variability and the resulting constant shocks to the economy are not routinely considered.

What about the externalities of these investments and the extensive production systems? Often the impact on the environment is not taken into account in economic analyses.

DM: Newer models try to take account of externalities, and it is also possible to design agriculture and water systems in a way so that impact on the environment is minimised. However, the notion of ecosystem services brings other dimensions into the design of irrigation systems, without necessarily making them more expensive. These need more exploration.

We would like to take up this keyword: valuation of ecosystem services. Setting up schemes for payment of ecosystem services (PES) is a challenging task, and transaction costs for PES schemes are usually fairly high.

CS: The concept of PES is extremely important, and the idea that upstream water managers are providing a service to downstream water users has to become part of our thinking. Any development in a river basin has to look across the basin and recognise that there are costs in one place that produce values in another, and look for ways to balance those. But PES is also very site-specific and harbours cultural difficulties. When paying for environmental services you may never really know what you get. Usually you would be investing in land-use changes, expecting that this will raise the amount of water available to you. But afforestation in the upper watersheds may actually reduce the amount of water available downstream. PES can involve many individuals and therefore be difficult to monitor, and not every social structure is equally well-suited. PES mechanisms are difficult to develop, but the concept of compensation for ecosystem services should be reflected in all river basin management planning.

DM: An important advantage of PES schemes is that they initiate negotiations that would otherwise not take place, for example between fishermen and farmers over irrigation, or between farmers and cities over water allocation.

Personal considerations regarding the *Comprehensive Assessment of Water Management in Agriculture*

The Comprehensive Assessment developed very complex scenarios of what might happen in water use between now and 2050. The optimum scenario combines measures in rainfed agriculture with increased efficiency in irrigated areas and a strategic increase in food trade. How confident are you that the optimum scenario will materialise?

DM: You have to be an optimist in order to achieve something! But we know that things are not going to develop exactly according to that scenario. Nonetheless, efforts like the CA raise awareness and hopefully prompt people to respond and make better choices. I think it is possible to have a much more sustainable scenario in the future.

Today's reality looks a little more bleak. If you look at the Aral Sea, Lake Tchad, the Jordan valley and the Dead Sea, or even California – will people go all the way until systems collapse?

Unfortunately a certain level of crisis seems to be necessary to trigger changes. Therefore, we need early warning systems that raise the alarm loud and clear before it is too late. Better and timely information can be a very efficient trigger of change.

If you were Minister of Agriculture in a sub-Saharan country, what lesson would you take and implement from the book and the assessment?

Investments in water and food are critically important for economic growth and development. And when investing, do not forget to look at the surroundings, the roads, technologies and human capacity, build up the institutions, and invest taking into consideration the value of ecosystem services.

And what would you do as a community leader?

CS: That depends very much on the site. I would give priority to whatever is keeping the community vulnerable, be it water supply, irrigation or market access. I would try to find out what the best opportunities are – is it rainfed agriculture, drip irrigation, or fertiliser and soil fertility? Then I would go to the respective chapter in the book to find out what the recommendations are, and would try to size those global messages down to the local level.

This book is the closing of a long process. What are the next steps?

JB: This is not at all a closure of something, it is the beginning of something! To identify key challenges and get the message out is one thing. Translating these global messages to the country level should not be too difficult, but this is a step that definitely needs to follow. Creating a dialogue at different levels, involving governments, researchers, NGOs and farmers' groups, is the most important step. Moreover, it is just as important to bring the message and the discussion to the decision-makers.

DM: The assessment is meant to be policy-relevant, but not policy-prescriptive. This is why the recommendations may sound imprecise. But this should be enough to convey an understanding of the options and their possible consequences, and the scenarios are a key tool for doing so.

Thank you very much for this inspiring discussion.