F@RMLETTER

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MICHEL JARRAUD,
Chair UN-Water

Water is fundamental to life. Population growth, urbanisation, and vastly increasing industrial and agricultural use have intensified the demands for this precious natural resource. At the most basic level, people need freshwater drinking supplies which are increasingly under stress in areas such as arid parts of South America and Africa and inland regions of Asia and Australia. Groundwater reserves are being depleted and, globally, water scarcity already affects 40 per cent of the people.

Climate change impacts including sea-level rise and potentially intensified extreme events such as floods and droughts are likely to exacerbate already manifested challenges like shifting seasonal rainfall, increasing climate variability and their impact on water resources availability. This will have far-reaching repercussions for food production, human health, energy, urban and industrial water supply and biodiversity. It will affect people, ecosystems and socio-economic development, potentially jeopardising sustainable development and poverty reduction efforts.

Higher water temperatures and low flow conditions as a result of droughts are likely to worsen water quality.
A reduction in groundwater storage in coastal areas can cause an intrusion of saltwater into groundwater-based water supply schemes. Sea-level rise in coastal regions likewise affects groundwater aquifers, reducing freshwater availability. Floods may re-activate river sediments containing toxic materials.

IT WILL REQUIRE POLICY SHIFTS AND SIGNIFICANT INVESTMENT, AND MORE COMPREHENSIVE AND SUSTAINABLE DATA COLLECTION AND MONITORING SYSTEMS TO IMPROVE AND SHARE KNOWLEDGE ABOUT CHANGES CLIMATE AND WATER AND THE IMPACT OF ADAPTATION STRATEGIES, DECISIONS AND ACTIONS

Improved integrated water resources management is the key to our efforts to adapt to climate variability and change. It will require policy shifts and significant investment as well as more comprehensive and sustainable data collection and monitoring systems to improve and share knowledge about changes affecting the climate and water, and on the impact of adaptation strategies, decisions and actions.

Water and agriculture are inextricably linked. Agriculture uses more than 70 per cent of freshwater resources worldwide. Knowing about the timing, location and intensity of rainy and dry seasons well ahead of the projected onset helps farmers plan the scheduling of planting and the variety of crops to be grown. Climate conditions also

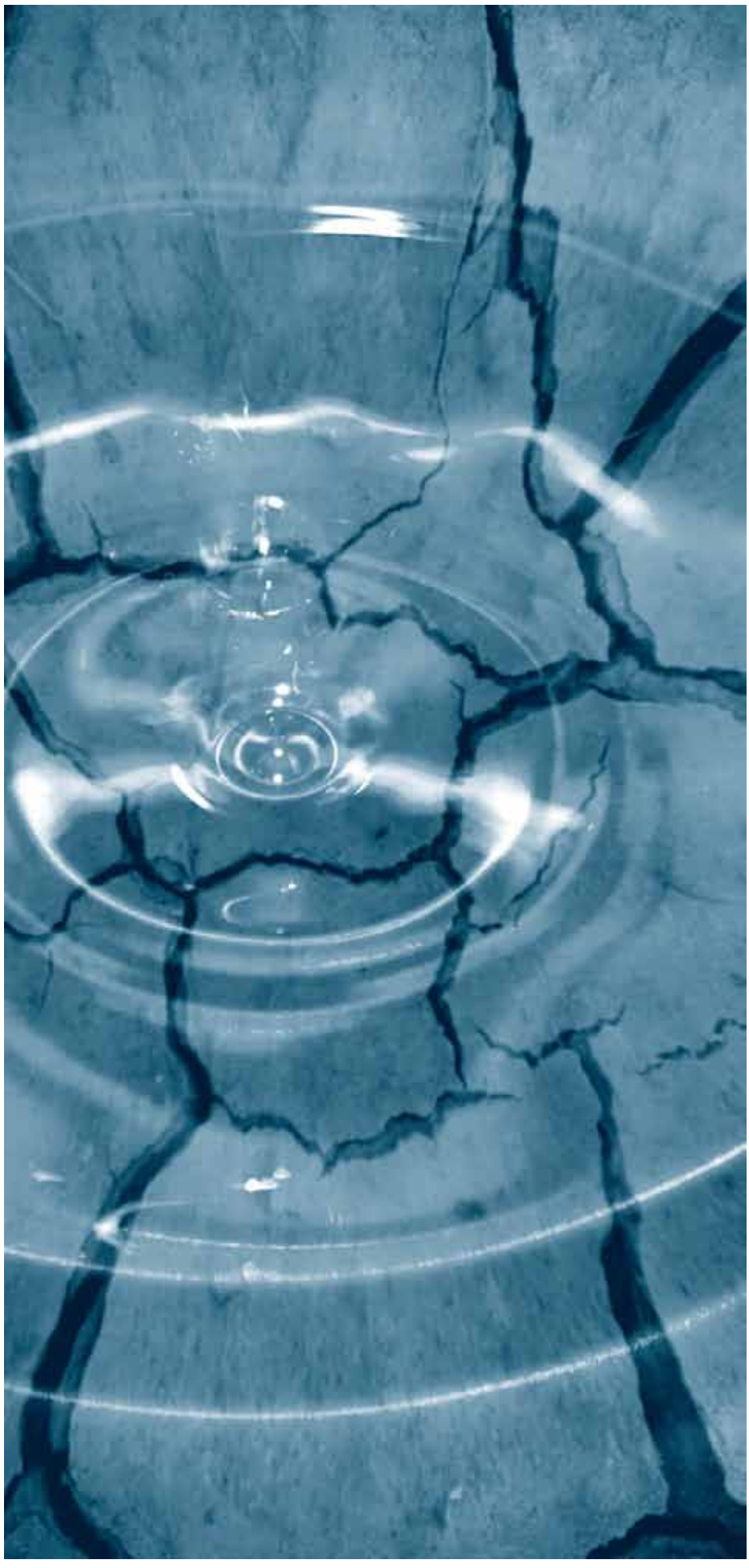
affect the amount of water available for hydropower generation. Better management of water storage in dams, reservoirs, streams and groundwater aquifers helps moderate the variability of water resources availability as well as improving the management of floods and droughts, in an integrated manner.

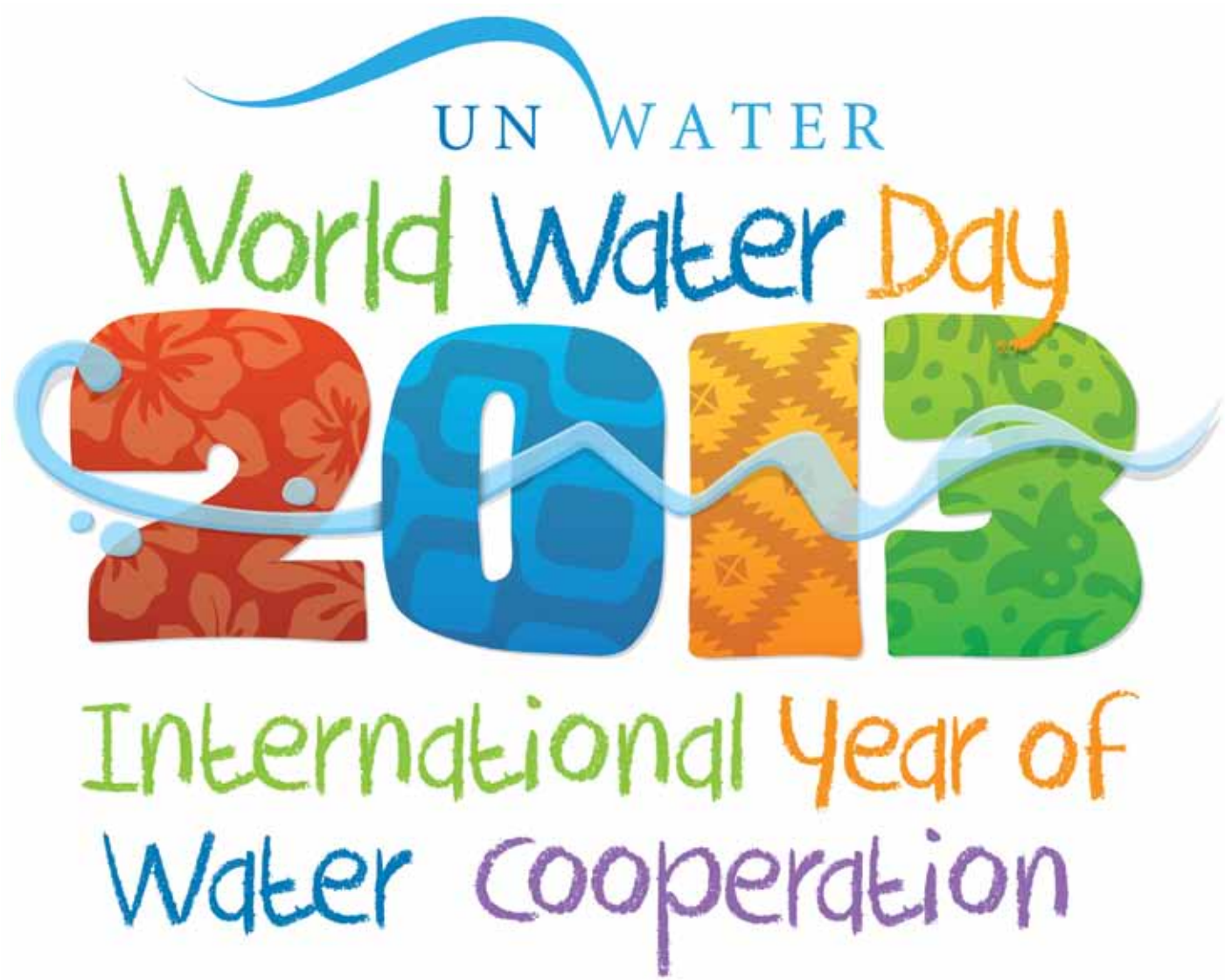
UN-Water was established to promote coordination and coherence in UN System initiatives that are related to UN-Water's scope of work and contribute to the implementation of the agenda defined by the 2000 Millennium Declaration and the 2002 World Summit on Sustainable Development. UN-Water has 31 Members from the UN System and a number of external Partners representing various international organizations and civil society.

On behalf of UN-Water, I am pleased to see that the World Farmer's Organization recognizes the vital role of water to the world's farmers and that many of the water-related issues facing our farmers are identified in this edition of the Newsletter. I am confident that there will be fruitful discussions amongst all stakeholders these issues at this year's World Water Week.

IMPROVED INTEGRATED WATER RESOURCES MANAGEMENT WILL BE THE KEY TO OUR EFFORTS TO ADAPT TO CLIMATE VARIABILITY AND CHANGE

MICHEL JARRAUD,
Chair UN-Water





WATER AND AGRICULTURE IN THE INTERNATIONAL YEAR OF COOPERATION

Josefina Maestu,
UN Office to Support the International Decade for Action: Water for Life 2005-2015

Proclaimed by the United Nations General Assembly on 11 February 2011, the objective of the International Year is to raise awareness, both on the potential for increased cooperation, and on the challenges facing water management in light of the increase in demand for water access, allocation and services.

"Water cooperation" refers to the peaceful management and use of freshwater resources at local, national, regional and international levels among various players and sectors. The concept of water cooperation entails working together towards a common goal, in a way that is mutually beneficial. In fact history has often shown that the vital nature of freshwater is a powerful incentive for cooperation, compelling stakeholders to reconcile even the most divergent views. Water more often unites than divides peoples and societies.

In agriculture this is certainly the case: water commissions, water

juries and irrigation cooperatives play important roles in their ability to help resolve disputes and manage water between local stakeholders, such as within farming cooperatives, cities, and industrial sectors. These local bodies are indispensable where there is competition for scarce water resources, where there is need to control illegal water withdrawals and wastewater disposal, which in turn compromise the resource and may instigate conflict.

To highlight good practice and exchange experiences of water cooperation the International Annual UN-Water Zaragoza Conference 2012/2013 **'Preparing for the 2013 International Year. Water Cooperation: Making it Happen!' from 8 to 10 January 2013**, focused on how to make cooperation happen. In relation to focused on how to make cooperation happen. In relation to Participatory Irrigation Management, the summary report of the conference explained that according to ICID (Suresh A. Kulkarni, and Avinash C Tyagi, 2013 Participatory Irrigation Management: Understanding the Role of Cooperative Culture) the philosophy of Participatory Irrigation Management (PIM) is hinged around developing cooperation with and involvement of farmers in operation, management, and maintenance of the irrigation systems at secondary and tertiary levels through the "Water User Associations" (WUAs).

The report highlights that during last three decades about **60 countries** having significant irrigated area have adopted PIM in varying degrees and ways. The WUAs are considered as the most appropriate entity to bring together farmers being served by a given infrastructure and act as an interface between the farmers and the Irrigation Agency towards conflict resolution and cooperation and also to build synergy among all stakeholders. IWMI and FAO have recommended a five pronged strategy for revitalizing Asia's irrigation (Mukehrji et al., 2009). These three strategies relate to PIM modernizing irrigation systems both technically and institutionally, managing groundwater use, opting for public-private partnership, and providing incentives to irrigation officials in achieving better irrigation performance. Based on the recent experiences collated through various ICID workshops (1998, 2007) and authors own field experience pertaining to the PIM, the following are the key lessons learned on the success or otherwise of WUAs.

• Sense of ownership: Real participation of farmers comes from a sense of ownership. Unfortunately, governments are still perceived as the owners of the irrigation infrastructure and water. Such an approach requires engagement with the stakeholders in a long patience-demanding process.

• **Cultural factors:** The new institutions should be based on a thorough analysis of the construct of the social, cultural and political relationship among various actors in the existing irrigation water management practices.

• **Legal framework:** Transparent and responsive governance structure is an important aspect of WUAs which is necessary for conflict resolution and accountability. It should spell out the possible sources of income, including water charges, subsidies etc.

THE CONCEPT OF WATER COOPERATION ENTAILS WORKING TOGETHER TOWARDS A COMMON GOAL, IN A WAY THAT IS MUTUALLY BENEFICIAL.

• **Financial viability:** A viable capital financing plan that identifies the amount of money needed to establish and maintain the functions of WUA, with potential sources of the necessary capital coming directly from members themselves, from surpluses generated by its activities, or from outsiders, needs to be developed. In most cases, governments provide the initial start-up costs.

• **Initiatives and incentives:** Unless a 'win-win' situation is clearly visible to both, the WUAs will not be able to deliver their objective. WUAs established through top-down or forced approach does not become sustainable. Both 'top down' and 'bottom up' approaches are required in establishing and effective functioning of the WUAs.

• **Capacity development:** WUAs managing the activities of cooperatives require skills in certain areas of financial and administrative management and should be backed by technical know-how. At the same time, the cooperative attitude is mostly driven by a dedicated and exemplary leader within a society. Such leaderships can and should be nurtured through various leadership building programs.

• **Integrated approach:** most water resource schemes besides irrigation have multiple objectives and there are competing interests mainly from domestic, industrial, hydropower, and environmental uses. Thus the participation of WUAs in such schemes shall be made simpler by integrating similar functions.

• **Replicability:** There is no blueprint of successful WUA. PIM involves interaction between different social groups, farmers, villagers and government. Since these interactions and their historical backgrounds differ among different societies, applying the successful WUA model of a given country may not necessarily lead to success in another.

• **Smallholder agriculture:** Intervention through the top-down approach in small holder irrigation development generally faces difficulties like too many implementing agencies and long delays caused by bureaucratic procedures. It becomes much more complex to organize and deal with large numbers of smallholder farmers. Smallholders often face constraints like weak property rights, resource poverty, lack of access to markets and financial services, and limited ability to tolerate risks.

Disclaimer

The content of this article reflect sthe summary report of the 2013/2014 UN-Water Conference 'Water Cooperation: making it happen! and do not necessarily reflect the views of the United Nations Secretariat. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

GOOD WATER MANAGEMENT NEEDS BROADER PERSPECTIVE

Peter Prins,
Project leader Climate and Agriculture, LTO Noord,

Introduction

The Netherlands is the world's 2nd exporter of agricultural and horticultural products. This North West European country borders on the North Sea coast in the delta of large rivers such as the Rhine and the Meuse and is partly situated below sea level. The country has a rich history in fighting water but also in water management where farmers have been playing an active role for ages.

The farmers' organization LTO Noord is one of the members of the national organization LTO Nederland and is active in the nine northern provinces of the Netherlands. This region is characterized by a relatively large proportion of soil-bound crops such as seed potatoes, flower bulbs, sugar beet, and vegetables. Dairy farming is another important sector. Clay, sand or reclaimed

peat are the most common soil types. Water management is generally well-ordered via special government bodies (Water Boards). Fields are generally well drained, via drainage pipes or by nature. The subsoil of the sandy areas contains fresh groundwater that can be used for irrigation purposes. The salt concentration of groundwater and surface water in the clay areas increases with a decreasing distance to the coast; this also restricts the possibilities for use in agriculture and horticulture.

The risks of salinization, desiccation and flooding increase as a result of climate change. The Dutch farmers' organization LTO Noord did not sit back and together with science and local policymakers the organization started identifying the required adjustments of water management and agricultural production. Within a 'farmer-led' project an iterative process was started together with the farmers and this led to various types of follow-up, such as research on pests and diseases and drip irrigation. This article describes a number of challenges concerning water and soil management.

The approach proved to be successful and led to the implementation of recommendations. However, there were follow-ups in pilots with farmers' organizations in Uganda (UNFFE) and Cambodia (CFAP) as well. The farmers' organizations in these countries are closely collaborating with agricultural research, governments, and agribusinesses to jointly identify the challenges in the field of climate adaptation. Through joint meetings with farmers' groups, knowledge about adaptation is turned into structural changes in farm management. But, research questions are formulated as well. This makes the approach very instructive for farmers as well as research partners: a grass-root approach in optimum form.

Farmer-led project

Apart from gradual warming, weather extremes are in particular affecting the harvest and income of the farmer. LTO Noord wanted to identify the risks incurred by farmers and how they can adjust their farm management to restrict vulnerability.

Together with its members, the farmers' organization started searching for practicable and attainable answers. LTO Noord involved all sorts of specialists from scientific research, agribusiness, and governments to characterize the issue and to find solutions. Primarily, the climate project had strategic significance for the farmers' organization. LTO Noord organized stakeholder meetings with specialists as orientation on the state of science and policy. In addition, various workshops were held for farmers; sometimes per sector (arable farming, dairy farming, greenhouse horticulture), sometimes per theme (such as pests and diseases). These meetings were organized in such a way that the input by farmers was ensured to guarantee a truly iterative process. As initiator, LTO could not only exert influence on the national adaptation policy and the implementation of such a policy but on the research agenda as well.

Agro Climate Calendar

Weather data in the Netherlands have since 1854 been collected by the national meteorological institute KNMI. Such long-term records of precipitation and temperature are valuable to determine the extent of weather change. For farmers, these observations, the models, and the predictions based on these models, play an important role in their daily farm management. A farmer decides on the basis of such predictions whether to apply fertilizer or to spray against pests and diseases.

Plant Research International (part of Wageningen University and Research Centre) developed an Agro-Climate Calendar (ACC); this calendar combines climate science with agronomic knowledge. The ACC links extreme weather events over the past 30 years to vulnerable stages in crop growth. Models, based on the IPCC, were used to predict whether the frequency of extreme weather events will change in the future. Wageningen UR identified various possible adaptation measures. This knowledge was shared with farmers by providing them with feedback. The value of this interactive approach rested in the large input by the farmers themselves. The researchers acquired insights into the attainability of the proposed measures while the farmers were challenged to think "out of the box". Practical on-farm problems and knowledge questions could be directly addressed to the partners in the study. The ACC can especially be seen as a useful tool for long-term investments such as the installation of detail drainage or purchasing irrigation equipment.

The most striking conclusion of this study in North Netherlands was that farmers can implement many measures under their own control by adjusting their daily farm management. These mainly concern improvement of water and soil management.

Agro Climate Calendar (ACC)

- Frequency change 2050 compared to historic climate (over 30 year period)

Climate factor	Scenario	J	F	M	A	M	J	J	A	S	O	N	D
Wet field	G+	+1	0	0	0						0	+1	+2
Delayed planting	W+	+4	+1	0	0						-1	0	+3
High int. rainfall	G+					0	0	0	0	+1			
Rotting of tubers	W+					0	0	0	-1	+1			
Heat wave	G+							+2	+7	+1			
Second-growth	W+							+12	+12	+3			
Warm and wet	G+							+4	+5	+1			
Erwinia	W+							+6	+6	+2			
Sustained wet	G+					-2	-2	-2	-4				
Phytophthora	W+					-2	-4	-5	-3				
Wet field	G+								-3	0	0		
Damage to tubers	W+								-3	-1	-1		
Warm winter	G+	0	+1	+3									+1
Rot and early sprouting	W+	+2	+3	+8									+1

PLANT RESEARCH INTERNATIONAL WAGENINGEN UR

Water discharge

Despite predictions concerning increasing drought and heat stress, farmers in the Netherlands indicate that their main concern lies in an adequate water discharge. A wet soil, for example., has a disastrous effect on the quality of the potato tuber. Two days in a saturated soil may result in the tuber being lost. Good water discharge and good detail drainage are crucial for the workability of the soil. There is a tendency towards more intensive drainage with the drain pipes at short distance. In addition, structure and permeability of the soil have rightly been given increasing attention over recent years as an inextricable part of a proper water discharge.

Adequate water discharge is also required at a higher scale level. Heavy showers will lead to a higher peak discharge. This requires adjustment of the water management infrastructure, which is currently often still dimensioned at a discharge of 12 mm per day. Additionally, a normalized protection against water flooding is reached by designating overflow and storage areas. This is a government task; a task in which the authorities are closely involving the farmers' organizations to arrive at proper boundary conditions (supporting policies).

Fresh water supply

The water supplied via the catchment area of the Rhine is distributed over various parts of the country. This distribution has been laid down in administrative agreements between the authorities concerned. But these agreements primarily serve the interests of shipping, drinking water supply, and energy production. But water distribution is very important for the agricultural function as well.

Fresh water is - through a system of lakes, canals, pumping stations and dams - distributed down to the capillary system of the agricultural area. This ensures good water levels and facilitates irrigation of agricultural crops. The increasing water demand, also resulting from warmer summers and vegetable cropping, will put the national water distribution under pressure. A lower river discharge further increases this effect. This means that there is every reason to search for solutions that offer perspectives for a

Foppe Jan Dijkstra

Foppe Jan Dijkstra isan arable farmer and member of the Seed Stock Academy, a learning network of specialized growers of seed potatoes in Groningen province. One group of farmers focuses on the experiment with drip irrigation in the cultivation of mini-tubers, very valuable propagation material for potato cultivation. The growers are still facing many questions. How much water and which nutrient dose need to be applied at which growth stage?

Dijkstra: "Last year we started with drip irrigation on a small scale. We supplied a few rows with water. The results were surprisingly positive: the number of tubers increased by (on average) 20 % in this experiment with 5 varieties while tuber size was more homogeneous". The experiment appealed to colleague farmers resulting in more experience being gained now. Dijkstra is now also supplying nutrients via the water. In this way, he hopes to achieve a positive effect on tuber quality resulting in the production of a larger number of viable tubers.

Dijkstra: "The costs of planting stock alone amount to some 25.000 euro per hectare. We do everything possible to give our crop the best possible care. Drip irrigation seems a good assurance for good results for us." Dijkstra considers a secure and sufficient supply of clean water as the main bottleneck. Surface water can, in this cas,e not be used for irrigation of the potatoes in view of the brown rot potato disease. Dijkstra is therefore at the moment using (harvested) rain water and mains water.

further development of agriculture and horticulture. With Deltaplan Agricultural Water Management, LTO has taken the initiative to – together with the authorities – work towards challenging, practical, and attainable solutions.

Salinization control

In coastal areas, fresh water is also used for flushing the canals to reduce the salt concentration. In these areas, with mainly clay soils, in particular crops such as seed potatoes, field vegetables, and flower bulbs require water with a low salt concentration.

The brown rot bacterial disease, however, is spread via the same surface water. A seed potato batch infested by brown rot will be rejected for export. For precautionary reasons the use of surface water for irrigation of potatoes in risk areas is therefore forbidden. The question therefore is whether there are alternatives to optimize moisture supply while maintaining safety.

Level-controlled drainage

On the higher drought-sensitive sandy soils locally fallen precipitation is – where possible - preserved as much as possible by raising the level in the ditches by means of dams. Level-controlled drainage is popular in these areas. The groundwater level of a field can be controlled by letting drain tubes run into collection drain tubes which in turn lead to a reservoir with a height-adjustable outlet. This makes it possible to deal with flooding by decreasing the groundwater level whereas this level can be increased during periods of drought.

More crop per drop

Scarcity creates inventiveness. Are new methods available to meet the water demand of agriculture and horticulture despite all this? New developments designed to meet the persisting water demand are announcing themselves together with the interest in precision farming. In Dutch horticulture drip irrigation is especially applied in perennial cultivations, such as fruit and nursery stock. But experiments are now also being carried out in annual rotating crops in large-scale arable farming, in particular focusing on potato cultivation. Experiments in the past were not very successful and neither cost-effective as result of the labor-intensity of putting

Wridzer Bakker

Together with his wife and son, Wridzer Bakker is running (runs a mixed farm with his wife and sun) has a mixed farm with arable farming, cauliflower and beef cattle. He manages his soil very conscientiously. He applies a lot of solid cattle and goat manure and green manure crops to stimulate soil life. And, Bakker is applying non-turning tillage with permanent driving paths. This means that the crop beds are not driven on, which stimulates a florishing soil life. Structure and permeability of the soil have increased considerably. In a field in the past known as the “bathtub” we now see no pools after a heavy shower. This illustrates that investments in the soil are paying off. Workability of the soil is much better and the harvested products have a better quality.

down and removing the tubes but also by the higher costs of energy, labor, and water supply. Tightened fertilization regulations, high costs of planting stock and focus on quality were among the reasons for a renewed interest in drip irrigation. Farmers, agribusiness and research organizations are collaborating in new experiments. It is expected that more fundamental plant physiological knowledge can optimize crop cultivation which would improve cost-effectiveness.

Underground water storage

The deeper groundwater in coastal areas is usually salty and unsuitable for irrigation in agriculture and horticulture. Fresh water 'balloons', however, are also found in the shallower underground; these are – as it were – floating on the salty groundwater. At various locations in the Netherlands experience is currently being gained with below-ground storage of fresh water by infiltration into the originally salt water as a way to increase the supply of fresh water.

Success strongly depends on the geohydrological situation and the costs of the required facilities (including permissions and monitoring). Application currently primarily focuses on greenhouse horticulture and fruit cultivation. New research will have to show whether it may also offer perspectives for arable farming. Acacia Water is lead partner in this project in which LTO is involved as well.

Rediscovery of the soil

The soil is an important production factor. Nevertheless, the attention of farmers and growers for proper soil care has faded over recent decades. Numerous initiatives show renewed appreciation of the soil. The significance of good soil life, good root-permeability, and a good capacity to supply and store moisture is being rediscovered, in which organic matter is playing an important role. It is worth noting that the Water Boards are now also recognizing the relationship between the use of agricultural soil and water issues. And the awareness of the importance of green manure crops and organic manure among farmers is increasing at the same time.

Finally

Adjustment to climate change demands well-considered steps. Resilience of agricultural management can be improved by investing in soil and water management. But cultivars and crop choice also determine the risk of harvest losses resulting from extreme weather conditions. Collaboration of farmers' organizations, research, agribusiness and governments enables knowledge dissemination to the farming community. Farmers' organizations can - through their local networks and their trust relationship with farmers - play a key role in this process. In the collaboration they can act as a bridge between science and farmer (grass roots) and make sure that research questions from the field are dealt with seriously and efficiently, in the knowledge that research does sometimes need time and cannot always provide directly applicable solutions. A pro-active approach on this theme strengthens the position of the farmers' organization, not only as a representative body but by influencing government policies as well. This is a common interest because both want practicable and applicable measures and a robust agriculture and horticulture.

It is of great importance that various knowledge disciplines, such as water, soil and agronomy are interconnected via crossovers to stimulate innovations and to disseminate knowledge. The step taken by LTO Noord and the Netherlands Water Partnership taken this month is very valuable in this respect. In the program More Crop per Drop these two organizations intend to relate Dutch knowledge in the field of water management with the knowledge on (worldwide) food production. It is up to the farmers' organizations to link up to these types of new networks.

More information:
facebook page Adapting Agricultu e to Climate Change

IT IS OF GREAT IMPORTANCE THAT VARIOUS KNOWLEDGE DISCIPLINES, SUCH AS WATER, SOIL AND AGRONOMY ARE INTERCONNECTED VIA CROSSOVERS TO STIMULATE INNOVATIONS AND TO DISSEMINATE KNOWLEDGE

SAFE USE OF WASTEWATER IN AGRICULTURE

Pilar Roman, *Associate Professional Officer, Climate Change and Environmental Sustainability, Regional Office of Latin America and the Caribbean*

Rapid urbanization is coming together with great challenges in terms of employment, food and nutrition security and infrastructure., Many rapidly growing cities are facing increasing water shortages, often aggravated by the effects of climate change, and insufficient sanitation coverage with higher exposure to contaminants. The production and commercialization of vegetables in and around the cities can contribute to mitigating such problems by improving food availability, generating employment and income, creating greener cities and favoring the recycling of waste.

Urban and periurban vegetable production translates into more water needed and may intensify competition for water resources among commercial activities, households and agriculture. However, this competition can be successfully addressed: water can be used in the city and reused in agriculture with benefits for all. Water reuse in agriculture has numerous advantages for all the parties involved as it provides a year round supply of water, together with nutrients and organic matter, to support crop production; providing food, income and employment to cities and improving urban landscape. In addition, well managed water reuse can lessen the pollution load on downstream watercourses.

Arguably, the traditional "linear society" approach to inputs and outputs is not sustainable, and a case is made here for adopting a more "recycling society" approach, to make productive gains in water use and reuse and reduce environmental pollution.

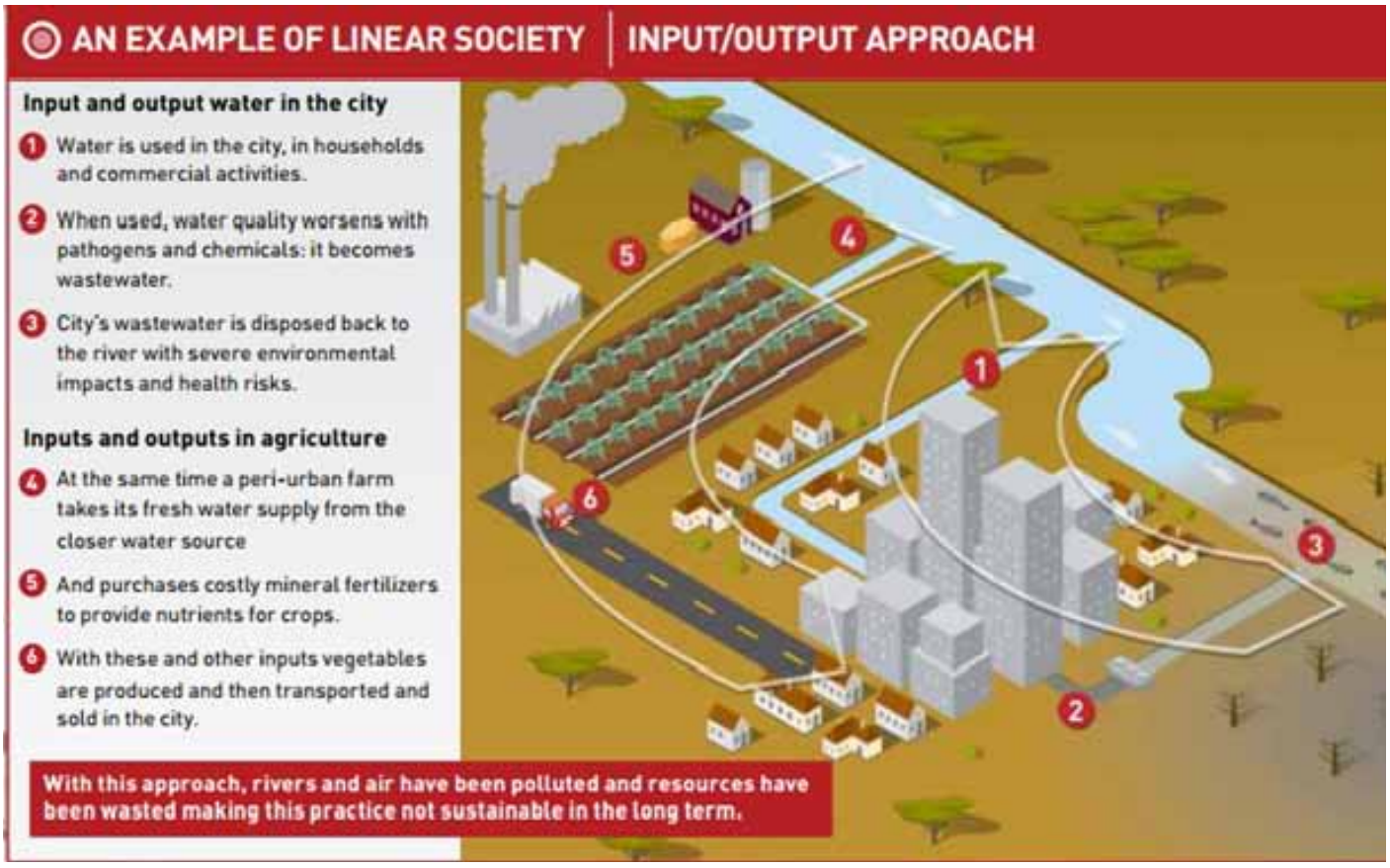
Global context:

The earth contains an estimated 1 351 million cubic km of water. Only 0.003 percent of this is classified as fresh water resources, that is, water that can be a source for drinking, hygiene, agriculture, and industry. Most fresh water is remote from civilization or too difficult to capture for use. The Food and Agriculture Organization of the United Nations (FAO) estimates that only about 9 000 to 14 000 km3 are economically available for human use each year (FAOWATER, 2008). The world's population is growing at a rate of about 1.2 percent per annum and is expected to grow by two billion by 2030. Providing adequate water for all these people will be a major challenge. Water is essential not only for direct human consumption and household purposes, but also for producing the food and manufactured goods necessary for life and improved standards of living. The common needs for water fall into the following categories: drinking water, agriculture, personal hygiene and public sanitation, domestic uses (food preparation, cleaning, outdoor uses), commerce and services, industry, recreation and tourism. commercial fisheries, and environmental and ecological maintenance, conservation and protection.

Many countries struggle to meet current water needs for basic sustenance and sanitation. The problem is compounded by increasing standards of living which increase the per capita use of water. Converting from rainfed to irrigated agriculture can increase yields of most crops by 100 to 400 percent and can permit the growth of different crops with higher income value. Humid-climate species can be grown in arid areas. Shifting away from rainfed agriculture often means that water must be available at unnatural times and locations, requiring infrastructure energy and labour. Even relying on groundwater directly beneath farms is becoming a problem as water tables fall. Because irrigation leaves salts behind in the soil, the rate of water application may have to be increased over time to counter salinization, though in many places rainfall can achieve this function. Compared to the daily drinking water requirement of 2 to 4 litres per person, producing a day's food requirement takes 2 000 to 5 000 litres of water per head. As a result, agriculture is by far the largest user of water, accounting for almost 70 percent of all withdrawals - up to 95 percent in developing countries - and demand is increasing (FAOWATER, 2008)

Improvements in lifestyle and the use of labour-saving devices also demand more water. Some examples are: community sewerage systems and toilets using water for the conveyance and disposal of human waste; household appliances such as dishwashers and garbage grinders; domestic hot water devices increasing the use of water for bathing; gardening and residential landscaping; leisure activities such as golf courses and aquatic parks; urban greenery for local amenities; increased consumption of manufactured goods; dietary changes involving higher consumption of foodstuffs with greater water requirements and; tourism and recreation increase with incomes, and many of these activities are water-intensive.

Meeting these water demands has often come with great environmental cost. In a well-known example, the Aral Sea has lost 85 percent of its inflow due to irrigated cotton production on its main feeder rivers. The fall in level by 16 metres between 1981 and 1990 has led to the disappearance of 20 of its 24 species of fish, the loss of almost the entire fish catch, and the creation of toxic dust-salt from the dry seabed, killing crops on nearby farmland (FAOWATER, 2008). This tragic episode illustrates the claim of the



natural environment as a legitimate user of water.
Climate change is likely to aggravate the scarcity of water that is being driven by other basic forces. According to one authoritative view, global warming of 2 º C would lead to a situation where "between 100 million and 400 million more people could be at risk of hunger, and 1 to 2 billion more people may no longer have enough water to meet their consumption, hygiene and food needs" (World Bank, 2009)

Even within countries with apparently abundant water, there are regions of scarcity or regions without the infrastructure to gain access to the available water resources. Areas of water withdrawals approaching or exceeding sustainable limits, for example, 75 percent or more of renewable water resources, are described as areas of physical water scarcity. On the other hand, economic water scarcity can occur where water resources are abundant, but deficiencies in human, institutional, or financial capital limit the access to it.
As water demands approach the limits of available resources, or the capacity of existing systems for water supply, competition between water sectors can arise. Urban areas with a sizeable industrial base often have greater economic capacity or political power to fund the infrastructure to develop new water supplies or reallocate existing supplies from agricultural to urban areas. In the competition for water, human needs often prevail over aquatic needs to sustain ecosystems and fisheries.

Competition for water resources is often at the expense of agriculture and the traditional economies dependent on it. Water traditionally has been considered a common public good. Without government controls however, this public good can be abused and access to water lost to sectors with political and economic power. Upstream users can both diminish and pollute the water reaching downstream users. In addition to social inequities, civil and even physical conflict can result from the competition for water. Where there is no established legal framework, or where this is violated, conflicts can result within regions or even between nations when one entity extracts water to the detriment of another. Some legal systems establish priorities in the rights to use water, often giving domestic and urban use a higher priority than industrial or agricultural use. The relationship between available water resources and their utilization can

CLIMATE CHANGE IS LIKELY TO AGGRAVATE THE SCARCITY OF WATER THAT IS BEING DRIVEN BY OTHER BASIC FORCES.

Threshold values used to characterise water stress within a region

Characteristic	Threshold	Situation
Water Scarcity Index, m³/ capita-yr		
Water stress	<1 700	The region begins to experience water stress and the economy or human health may be harmed
Chronic water scarcity	<1 000	The region experiences frequent water supply problems, both short and long-term
Absolute water stress	<500	The region completes its water supply by desalting seawater, over-exploiting aquifers or performing unplanned water reuse
Minimum survival level	<100	Water supply for domestic and commercial uses is compromised, since the total availability is not enough to fulfil demand for all uses (municipal, agricultural and industrial)
Water Intensity Use Index		
Water stress	>20%	The region is experiencing severe water supply problems that are addressed by reusing wastewater (planned or not), over-exploiting aquifers (by 2-30 times), or desalinating seawater

Source: Adapted from Jiménez and Asano (2008b)

be established using the water scarcity index.

When this index signals potential water scarcity, the country concerned would need to take measures to alleviate the situation, involving either- or both --demand management and supply augmentation. The resources to be developed could be conventional (surface or groundwater) or non-conventional. Increasingly, the development of new conventional resources is not feasible on grounds of cost, or faces opposition from conservationists or others who prefer the status quo. On the other hand, some non-conventional resources are also questionable on grounds of sustainability problems (e.g. desalination in terms of brine disposal and high energy costs). Problems such as these increase the relative attractiveness of reclaimed water, though this has problems of its own. Environmentalists are concerned that reuse in the upper part of basins can reduce the availability of water for ecosystems further downstream. There are also public health risks from the use of reclaimed water, and its prolonged use could impact soil salinity depending on treatment level, though it may also enhance soil fertility and organic matter content. However, there are ways of mitigating any harmful impact on agriculture, e.g. using good quality water in the initial growing period and poorer quality water later - this practice can even increase the quality of certain fruits.

Communities reliant on direct precipitation and natural surface water supplies are at the mercy of the availability of these supplies over time and space. They are also susceptible to flooding and drought. Groundwater is less affected by short term weather conditions but is vulnerable to long-term overdraft, resulting in increased pumping costs, salinization from seawater intrusion and long residence time in contact with minerals, and subsidence. The growth of urbanization and irrigated agriculture weakens the bond between naturally available water supplies and the timing and geography of demands. This has necessitated an infrastructure of canals or pipes to transport water and dams to capture river flows for later release when the demands occur. In developing countries the costs of such infrastructure can be prohibitive. In developed countries, the most cost-effective locations of dams and other schemes of water development have already been taken. Further water development not only is more costly but also competes with the needs for environmental protection of water quality, fisheries, and wetlands. In some cases, limitations have been placed on historic extractions of ground and surface waters to prevent further environmental damage or to restore the sustainable yield of groundwater.

Reusing water

Reusing wastewater is an important option for Integrated Water Resources Management (IWRM) which is concerned with managing all aspects of the water cycle, and with optimizing the use of water in all its aspects. The World Summit on Sustainable Development in 2002 called for all countries to develop IWRM and water efficiency plans. This approach includes the following elements, amongst others: assessment of water needs in collaboration with end users; examination of all the water sources available; and matching water supplies to needs based on the quantity, quality and reliability required for the various purposes and the costs of supply relative to the benefits in each case. The reclamation of wastewater and its reuse in agriculture is gaining wider acceptance in many parts of the world. In many water-scarce countries, wastewater has become important in bridging the demand and supply of water in different uses. The drivers of wastewater reuse are somewhat different in developed and developing countries, but there are common problems of increasing population and food demand, water shortages, and concern about environmental pollution. All these forces make reclaimed water a potentially valuable resource. Water reuse does, however, entail changes in the traditional frameworks for water allocation, funding structures, fixing of water-quality standards, regulatory frameworks, and institutional mandates. It involves good governance at all levels in order to develop a holistic approach and sets of consistent policies for water allocation meeting multiple user needs.

http://www.ais.unwater.org/ais/course/view.php?id=6

http://www.fao.org/docrep/012/i1629e/i1629e.pdf

WHEN SOLVING WATER PROBLEMS, PRAGMATIC OFTEN TRUMPS PERFECT

Jeff Smith,
has worked as a journalist and media development trainer for more than 25 years in Asia, Africa and the United States

The International Water Management Institute's (IWMI) Mark Giordano has struck a chord recently with his presentations of why Integrated Water Resources Management (IWRM) might not always be the best approach to solving our water problems.

IWRM promotes a coordinated, democratic approach to managing water, land and related resources, involving multiple interests in policy making. While the traditional approach was fragmented, IWRM is based on the premise that water is a shared resource, and should be managed jointly and in an equitable manner for social and economic good, while also protecting eco-systems. Giordano, IWMI theme leader of water and society, begins his talks by saying those are reasonable principles as guidelines, but they can cause problems when the ideas become a formulaic doctrine as is

now often the case.
"The IWRM concept is very nice but it's basically been turned into a dogma or a condition for international bank lending in developing countries," Giordano said. "It's forcing reasonable first ideas into law."

Sri Lanka
He cited the example of what happened when the IWRM process was "inflicted" on Sri Lanka two decades ago. International donors funded water policy reform focused on IWRM ideals, including stakeholder participation, that formed diverse working groups and generated 115 meetings and discussions. The process culminated with a draft water policy and law that included most of the ideas associated with the IWRM ideal, including tradable water rights and the reorganization of water administration based on river basin organizations.
Then came the backlash – protests that the process really wasn't open, that it was merely done to satisfy donor demands, that cultural norms about the value of water weren't understood.

"The government withdrew the policies," Giordano said, and 20 years later Sri Lanka still lacks a water policy and a coordinated strategy to deal with the recent droughts and floods. "Not only was (IWRM) not useful, the way implementation was done set back real reform."
So what should be done instead? "You can do lots of things," Giordano said. In his presentation, Giordano gives examples.

Central Asia
In Central Asia, treaties based on IWRM ideals were signed to solve the Aral Sea problem after the break up of the Soviet Union, but they simply haven't been followed in the two decades since. For example, tensions still exist between hydropower-centric upstream countries and downstream countries that aren't getting enough water to irrigate their crops.
The recommendation: Scrap the basin-wide approach and look for smaller solutions to reduce transboundary conflicts and create space for broader negotiations. Downstream countries can use managed aquifer recharge to store water from winter releases, thereby reducing the need to change upstream practices. Individual rivers and canals that cross national boundaries can be jointly managed, without waiting for a functioning basin wide agreement. Initial indications are that this is working to solve real water problems.

Gujarat
In Gujarat State in western India, heavily-subsidized electricity to the agricultural sector led to aquifer overpumping, a nearly bankrupt electrical industry and poor rural power supplies.
The suggested IWRM solution to the groundwater crisis was to price electricity and groundwater at its cost – a politically unimplementable move that sparks massive farmer unrest and can bring down governments, Giordano said.
IWMI instead pushed for a pragmatic alternative: keep intelligent subsidies but also separate power feeds for farm and non-farming uses, provide uninterrupted power for irrigation but only during specific periods. Other recommendations included supporting on-farm water storage and micro-irrigation. While pricing as a solution had been discussed for 20 years to no effect, these recommendations were actually implemented as part of a program called Jyotigram Yojna (Village of Light) and losses to state electricity boards and groundwater pumping are down. And the plan is being copied in other states.
Giordano said his presentation, while controversial to some in the water-management circles, has resonated with his audiences. He concludes that while IWRM provides good ideas, the almost universal focus on it by the water management community has caused us to lose sight of other promising options that can solve real-world problems.
"Keep the ideal in mind but don't worry about being perfect," he said. "Perfect isn't going to happen, so let's look at what makes things better."

See Mark Giordano's Powerpoint Presentation: Non-Integrated Water Resources Management

FOCUS ON WATER IN CLIMATE PROJECT LTO NOORD IN CAMBODIA

Sotha Sok, *managing director CFAP (Cambodia)*
Peter Prins, *Project Leader Climate Change and Agriculture LTO Noord (Netherlands)*

Dutch Farmers' Organization LTO Noord is running a project with Farmers' Organisation CFAP in Cambodia focusing on adaption of agriculture to climate change. Together with partners from Wageningen University and Research Centre and consultants from MWH Global there were several missions during which discussions were held with stakeholders in the national policy and research arena. Collaboration with the Dutch partners with their various backgrounds (farmers' organization, science and private sector) opened doors for CFAP. CFAP could introduce its ideas on climate policy and research, referring to the needs of farmers.

Climate change is a hot topic in Cambodia. Heavy and erratic rainfall causes floods and yield losses. Farmers are worried about a new phenomenon: a false start of the growing season. After a period of rain, farmers started to sow and plant. But after a few weeks dry and hot spells destroyed the young, just germinated, plants.

Although the amount of annual rainfall in Cambodia is 1500 mm, much higher than in the Netherlands, most of this water is lost by run-off, evapotranspiration and infiltration into the soil. Just a small part of this flow will be available for crops during the growing season. In the context of our collaboration we had several meetings with farmers at village level. These farmers stressed that they could not always and everywhere get access to major irrigation systems. Wells are sometimes a solution but a lot of these wells ran dry since groundwater is used for irrigating paddies.

Now, most farmers in Cambodia want to construct a family pond for harvesting rainwater. Such a pond could provide enough water for vegetables. Due to the costs only a few can afford this investment. But all benefits are often not taken into account.

CFAP therefore wants to enable small producers to grow low external input vegetables, rice and to sustainably raise animal/poultry and promotes a more integrated farm management. Part of this concept is an integrated family garden, animal raising including a compost-producing plot, trellis/roof shelter, and - of course - a water basin. Farmer members will then be able to continue their farming activities year-round regardless of the threats from climate conditions and changes.
The expertise of farm leaders/staff members needs to be strengthened to enable them to play their role in guiding farmers. Software training needs to be included in these activities to provide timely information related to climate change through internet or SMS. Strengthening farmer awareness of weather changes should be part of the training. Farmers' organizations should get early access to meteo and weather forecasts to enable them to extend information to their producer members accordingly.

Public meteo forecasting is very important but needs to be done very carefully to prevent false forecasts. The announced heavy floods in the year of dragon, which Cambodian people considered as a serious threat, led to farmers in the lowland parts of the Mekong Delta taking all sorts of anticipating steps . No crops were sown and farmers lost income. This false information seriously harmed the farmers' cropping calendar. This illustrates that forecasts must be very reliable and science-based.

Aiming to increase vegetable production by their farmer-members, CFAP succeeded in making arrangements with middlemen to collect and sell products grown by farmers.
Part of this strategy is improvement of the cultivation of vegetables, by using a plastic mulch and by adding organic fertilizer.
The basin in this concept is square, with steep slopes covered by plastic.
In the discussion with farmers Ms Kon Rany suggested to improve this concept in a more natural way. She wanted the basin to be a multifunctional source of income. So, instead of only using it for water storage, these ponds could be used to grow water plants, fish and even frogs in the slopes. When these slopes are not too steep, frogs can find a place to hide and to reproduce. Farmers were enthusiastic. Fields experiments will be executed to define the details.

But water is not the only important key factor in crop production. Farmers sometimes complained about disappointing harvests, even after they applied a lot of water. We took a number of soil samples for analysis in the Netherlands. Some of these soils were found to have a very low organic matter content (sensitive to drought) and some samples showed a very low nutrient level.
In view of these experiences it needs to be stressed that climate adaptation cannot be dealt with by one single measure. An integrated, holistic, approach is required. Farmers' organizations can play a coordinating role to find partners and tools to arrange such an approach.
Farmers' organisations, farmers, governments, development agencies, researchers, scientists and donors have to work in good cooperation to achieve results that serve the direct interests of farmers. The meetings with farmers and stakeholders (government, research institutes, development agencies) organized in the context of our mutual project, following the model of climate change adaptation of LTO Noord were fruitful. The farmers' voice is heard.
All this supported CFAP in finding its position in policy making processes and the agricultural research agenda. And it encouraged policy makers and researchers into more collaboration at grass root level, with farmers and their leaders.

CFAP will continue this collaboration and learning process by implementing an Action Plan to gain experience with a new design of a multipurpose pond and other adaptation measures, based on an integrated approach. This cooperation between CFAP and the Dutch partners is financed by Agriterra (Netherlands).

IMPROVING QUALITY OF LIFE

What happens when Israeli irrigation specialists, German development experts and Ethiopian agricultural professionals join forces on a project? They achieve results that are only possible through teamwork – and improve the quality of life of thousands of people in the Ethiopian highlands.

Philipp Hedemann, *Journalist*

Weldu Gebremeskel energetically treadles a rather antiquated foot pump.
Slowly, water from the nearby canal fills the 500-litre tank next to him. The 68-year old only has to pump just a few hundred times more to commission the first drip irrigation system on the plateau – on his own field! Weldu Gebremeskel is one of 400 farmers set to benefit, along with their families, from an irrigation and water usage programme in northern Ethiopia.

The triangular cooperation between the Ethiopian Government, the Center for International Cooperation of the Israel Ministry of Foreign Affairs (MASHAV) and Germany's Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) is designed to help small farmers cope with the consequences of climate change.The moment has finally arrived. Weldu Gebremeskel turns the blue plastic handle on his new water tank. With so many eyes watching him, he appears a little nervous. Twenty-seven agricultural experts, each with a six-day training course behind them, had helped the small farmer to lay

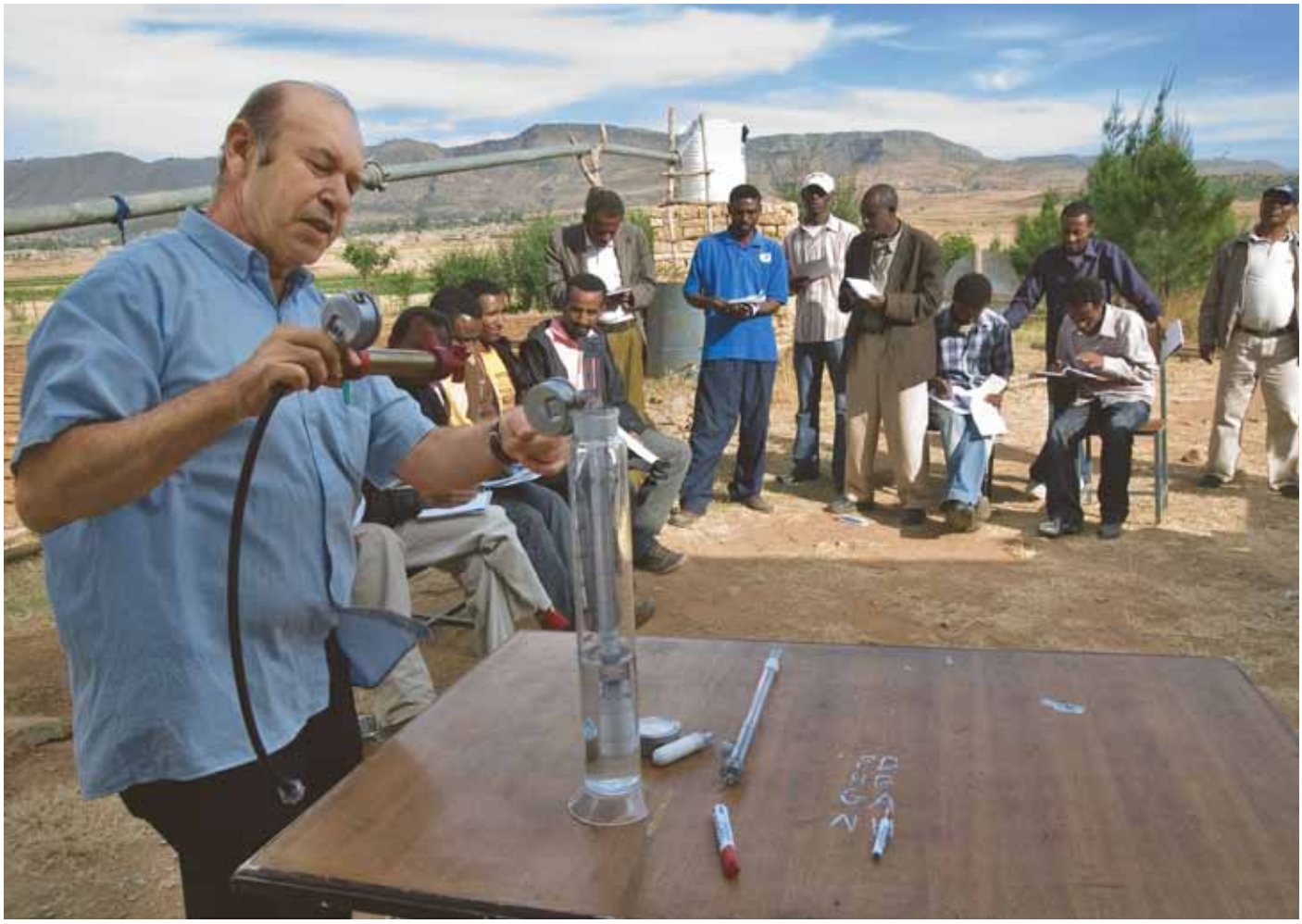
lengths of perforated black plastic hose across his land measuring barely one hectare. As Gebremeskel turns the handle, everybody stares at these perforations as if transfixed – at first, nothing happens. But suddenly, a few seconds later, the first droplets emerge from the hosepipes and trickle away into the dusty earth.

Up here at an altitude of around 2,000 metres it has not rained for over three months.
The fierce intensity of the sun and the strong winds during the dry season have left the stony land parched. But water from the new irrigation hoses is not a drop in the ocean. The dark patches of land grow larger with each droplet. At the moment they are still 30 centimetres apart, but before long, the dry earth between the damp patches will also become moist. 'I'm excited, happy and grateful all at once,'says Weldu Gebremeskel.

The new irrigation system will give my family a better life.' The water trickling into Gebremeskel's field represents the highpoint so far in the co-operation agreed in May 2008 by the then German Environment Minister, Sigmar Gabriel, and the Israeli Foreign Minister at that time, Tzipi Livni, to mark the 60th anniversary of the creation of the State of Israel. The two close allies wanted to work together to help African states adapt to climate change and make better use of their water resources. Just two months later,the Ethiopian Ministry of Agriculture and Rural Development was brought on board. The project was launched in May 2009 for a term of three and a half years. Financing is split three ways with €1.5 million coming from the German Environment Ministry, US$1 million in advisory services from the Israel Foreign Ministry's Center for International Cooperation and €100,000 from the Ethiopian Ministry of Agriculture.
The objective is to develop sustainable irrigation systems in twelve locations in the Ethiopian regions of Tigray, Amhara, Oromia and the southern region. Training will be provided for around 5,000 farmers and their families.

Three harvests per year
Weldu Gebremeskel used to draw water from the canal using an old diesel pump, which would leave his field flooded. Much of the water evaporated, the rest washed away valuable topsoil and left parts of the field under water, whereas other more elevated areas remained bone dry. 'Using the old method I managed one harvest a year. The new approach should give me up to three harvests and boost the yield per harvest by as much as 50 per cent,' explains the father of seven optimistically.

Selam, Weldu Gebremeskel's second youngest daughter, has come out to the field to see with her own eyes what her father has been talking about for so long. This young woman with a crucifix tattooed on her forehead worked for two years as a domestic servant in far-off-Dubai. Now she has returned to Ethiopia to help her family, who have tilled the barren soil of the Ethiopian highlands all their lives. She watches attentively as the water turns the dust into fertile agricultural soil. 'If this means we can now harvest more chilies, tomatoes and onions from this field, then we will also be able to sell more,' she says. 'And then



reinvest the money in an irrigation system for our second field. What her father is practicing in his small field will hopefully serve as a lesson to others. Although older in years, he remains youthful in mind and open to technological advances. For this reason he has been voted a 'model farmer' by his village, which still uses traditional agricultural methods that have been practiced for centuries. 'In Ethiopia innovations are often met with skepticism, even though you could hardly call what we are doing "high tech wizardry".

But when the other farmers realize irrigating fields with this new technology produces higher yields, they will follow suit. Just as important as the irrigation system, however, is the more rational approach to water use. Here time is of the essence; we need to achieve results quickly, since climate change can no longer be ignored,' explains GIZ employee Eckart Bode. He is working on the Ethiopian-German Sustainable Land Management programme, an initiative financed by the German Federal Ministry for Economic Cooperation and Development (BMZ) which encompasses the triangular partnership between Israel, Ethiopia and Germany initiated by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

Gad Elharar, who along with Weldu Gebremeskel and the 27 agricultural experts helped install the 32 hoses that now deliver water at a rate of 1.2 litres per hour, would not really call the irrigation system 'technology'. The Israeli expert is normally responsible for programming large-scale computer-controlled irrigation systems worth millions.

He has worked in over 50 countries. This system is low tech, of course. But it is highly effective and cheap. The farmers are able to maintain the technology themselves.
The hoses are produced in Ethiopia and therefore create jobs locally,' says the trainer. Altogether the cost of the water tank, foot pump and hoses amounts to the equivalent of €250, and thanks to improved yields the farmers will have refinanced the investment after one year.

'Everyone can benefit'

Tsige Fesseha is also excited. She is the only woman taking part in the agricultural training program. 'I come from a farm,' says the graduate farmer, the first female in her family to go to university. 'My parents farm a small field and would certainly benefit from an irrigation system like this.' But even the most sophisticated irrigation system can be worthless if the weather conditions are not right. In northern Ethiopia there is either too much water – or too little.
The transition from rainy to dry season is becoming more and more difficult to identify. Often it doesn't rain for months; then when the rains finally come they are heavier than ever,' explains Eckart Bode. Under conditions such as these, efficient and reliable

irrigation is becoming an ever greater necessity. That is why the Ethiopian Government decided to build a dam above Weldu Gebremeskel's field thirteen years ago – but this failed to generate the expected positive impact on agriculture. Although, after the rains, the reservoir holds up to 1.7 million cubic metres of water, most of it simply goes to waste.

' The water runs away unchecked through trenches in the fields. As much as 70 per cent is lost in this way,' says water engineer Kimariam Negusse. He is standing up to his waist in an irrigation channel currently being excavated by helpers from the nearby village. The contractor is reinforcing the ailing irrigation channels to prevent the precious resource from trickling away unused on its way to the fields. One of those helping to build the channel is 19-year-old Freweyni Mesfin. She and her friends drag sandbags to the freshly dug trench, which will later be lined with concrete. 'It's tiring work, but I enjoy it here,' says the farmer's daughter, whose family farm a small field around 500 meters below the construction site. 'First, itis a way to earn money; and secondly I know the channel will benefit me and my family.' Heftu Mekonnen from the Agriculture Office of Tigray province has come to the site to see how work is progressing. The agricultural expert is very satisfied: 'Once the channel system is complete, we will be able to irrigate 100 hectares. That will benefit up to 2,500 people,' he says. Mekonnen explains that this has mainly been possible thanks to excellent cooperation between the project partners:

'The Israelis are the world's finest irrigation experts. The Germans have been in Ethiopia for a very long time and know how to plan and finance such projects. And we Ethiopians put the plans into action. It all works perfectly. We should do more projects like this that provide benefits all round,' says the Ethiopian.

Even if he is not familiar with the term 'triangular cooperation', Weldu Gebremeskel would surely subscribe to this view. The following morning he returns to plant his seedlings in the patches of dark earth, evenly moistened by the black hoses. In just two months the farmer hopes to harvest and sell his first crop of tomatoes. He has already calculated exactly how many meters of new irrigation hose he will be able to buy for his second field using the profits.

Source: GIZ-Magazin akzente 1/2011
Photos: Michael Tsegaye.

DEALING WITH WATER: A STORY OF INDONESIAN WOMEN FARMERS

Lani Eugenia,
General Secretary of Puantani

Aisyah is a woman group leader in a small village called Pamoyanan village of Purwakarta district, in West Java. The women farmer group called "Anisa" (which means women) has 30 women farmer members that consist of paddy, cash crop, forest and even garden women farmers. They manage about 20 hectares of land owned by each member with a different type of ownership. Some of the women have their own small plot of land, some land is owned by the family, and the rest are land tenure [1]. The geographical condition in this village is slightly arid and hilly.

Water management in farming activities To manage the water for their farming activities, particularly paddy and cash crop, they still rely on the rainfall. More than 40 years ago, an irrigation system was established in the area, but since it was badly broken a long time ago and never properly fixed, no benefits can be gained anymore from this infrastructure.

They were forced to use traditional knowledge (moon approach) in order to decide a planting season, but since the seasons cannot necessarily be predicted, they have become less confident in using this method, yet some of them are willing to take a risk. Recently, a new irrigation system has been developed in this village, however the new construction in progress is just 200 meters long, and a wider irrigation channel is needed in order to properly utilize the water resources.

There are some initiatives from this group to apply water jet pumps in order to preserve water for use during the dry spells, but access to this

kind of technology is very limited, and the geographical conditions are not conducive to supporting this technology. Furthermore, the use of water jet pump in this area could only cover a very limited farming area, as priority is given to providing clean water for other purposes such as sanitation. Also, in a specific area, gas has come up from the ground.

Headed by the leader, Aisyah, this women's group is recognizing a spring that flows from the mountain and through the village. As planned, in the future this spring will be discharged from the mountain to the village as water harvesting resources in order to prepare for the dry season. However, this is a social consensus, that the priority for the utilization of this water will be to fulfill clean water and sanitation purposes.

In some other areas, such as Subang district, 15 kilometers away, which has a reasonable level of availability of ground water, wells often become a good alternative to support the agricultural activities. It is often also used for horticulture and not usually used for paddy farming, In case of aisyah, due to the structure of land, wells are not sufficient to support agricultural purposes.

Women Participation in Water Management Program

Learning from the community movement in managing water harvesting called "embung", in some district areas, a government program entitled Participatory Irrigation Management (PIP), which is a commitment as a gender responsive policy has been implemented to involve the participation of women and men farmers in the community. There are also other active water management groups such as those under the project "Farmers User Water Irrigate (P3A)". These participatory processes align the experiences, aspirations, needs and addresses women's and men's needs in the process of planning, implementation, observation and evaluation .

Farmers (women and men) are expected to be able to generate a democratic institution in the area of irrigation management systems at the farm level as a legal entity that has rights and authorities in their area and scope, also to enhance the capacity of women and men farmers in technical , financial, management, administration and organizational skills independently and sustainably.

It is basically addressed to ensuring access, participation, control and benefits to women in irrigation systems, since most women family farmers are usually those taking care of the ,ajority of on-farm activities, while men are mostly engaged in non-farming activities. Despite this situation, in the past, irrigation systems were managed and controlled largely by men.

An implementation and evaluation report of the Participatory Irrigation Management project in Kulon Progo District, Central Java a group of farmers in Sindutan village, sub district of Temo, composed of about 67 farmers, 48 men farmers and 19 women farmers has shown that the program has significantly empowered women farmers in agricultural development through access, participation, control and benefit of irrigation use.
Such initiatives help to raise and enhance the awareness of men and women farmers and their community about the important role of gender responsive knowledge in irrigation management systems and the value of

The absence of women in water irrigation management or even the knowledge to access the information needed, often leads them to struggle with water related problems for agricultural production.

working together.

The involvement of women in the program has contributed to the effectiveness of water irrigation utilization and thus minimizing the level of water loss. Furthermore, a good implementation of water irrigation management has enhanced the level of production as well as enhanced farmers' income.

1. The phenomenon explained above in the story of Aisyah and their women farmers' group is similar to the situation faced by many other women farmers who struggle to access water for agricultural production. Rainfall still remains the biggest resource of farming activities that rely on the weather and climatic conditions.

Women farmers are expected to access climate and weather information to avoid taking decisions that lead to losses due to crop failure. Closer collaboration between the department of meteorology and climatology, research institutions and the farming sector is needed to provide a precise weather and climate forecast to support farming and agricultural activities.

2. While solutions to access to natural water resources is available, the priority is to utilize water resources for clean drinking water and sanitation. A further strategy and technology are needed in order to maintain the availability of water to support women in agricultural activities.

3. Access to irrigation still remains a viable alternative as a reliable water resource to support women in agricultural production, though these irrigation facilities are still inadequate. Investment in irrigation is one of main priorities for agricultural development.

4. Considering that women farmer constitute the majority of farm labor in the agricultural sector, women's empowerment programs in water management is required in order to strengthen these systems increase their effectiveness.

5. Natural water resources as well as the traditional knowledge of women farmers and their community in utilizing water resources, must be preserved.

[1] *As explained by the resource, Mrs. Aisyah, Puantani coordinator for Purwakarta Chapter, West java in a small survey and interview of women, water and agricultural purposes. Puantani, 2013.*

[2] *ReLaporan Pelaksanaan Kegiatan Pengelolaan Irigasi Partisipative, Kabupaten Kulon Progo, Kementerian Pertanian Dirjen Sarana dan Prasarana Pertanian, hal 1.*

THE YOUTH, AGRICULTURE AND WATER NEXUS IN SUB-SAHARAN AFRICA

A GROWING YOUTHFUL POPULATION, AN OPPORTUNITY!

Fréjus Thoto,
YPARD representative for Benin and the coordinator of YouDev the "International Youth Platform for Sustainable Development"

Nobody knows with certainty what the world's future will look like in terms of demography. But one thing is quite sure; we will need to feed more and more people with declining resources. The current world population of 7.2 billion is projected to increase by almost one billion people within the next twelve years, reaching 8.1 billion in 2025 and 9.6 billion in 2050, according to a new United Nations report, World Population Prospects: The 2012 Revision released in 2013. The demographic situation is bound to change dramatically in sub-Saharan Africa where the population is expected to increase from 860 million in 2010 to 2 billion in 2050 because of its youthful population. Today two out of three sub-Saharans are under 25 years old. This fast growing population must be seen as an asset since it brings a unique opportunity for rapid human capital development and economic growth. Sub-Saharan agriculture can tap into this valuable resource to advance food security. But some challenges need to be addressed first. One of them is related to water management for agricultural purposes.

Challenges and opportunities for youth in agricultural water management

Though sub Saharan Africa has large land and water resources and diverse agro-ecosystems, enhancing agricultural productivity is still a challenge. Millions of poor men and women find it difficult to access water and many farmers face water scarcity even when resources are available. Of sub-Saharan Africa's abundant renewable water resources, only 3% are withdrawn for agriculture. About 4% of arable land is equipped for irrigation, of which less than 10% is serviced by groundwater (FAO 2011). Recent climate change and variability have worsened the situation. In this context, re-examining the critical role of water in achieving food and nutritional security from a youth perspective is a must. Young people can be motivated to value millions of hectares not yet cultivated. For that to happen, issues related to agricultural water management must be taken into consideration. All agricultural activities need large quantities of water and being able to mobilize them within a production system is a valuable asset. But any kind of infrastructure for agricultural water management requires an initial investment that youth are very often incapable of making. Installing irrigation technologies or building a tank for water harvesting is not easy for young people but is an important pre-condition for them to succeed in agriculture. A recent study report by AgWater Solutions Project implemented by International Water Management Institute (IWMI) and Partners concluded that smallholder irrigation in sub Saharan Africa could improve farmers' incomes. In Tanzania, half of the dry-season cash incomes of smallholders come from growing irrigated vegetables. In Zambia, the 20% of smallholders who cultivate vegetables in the dry season earn 35% more than those who do not.

Every day many young people are struggling to sustain their farms and address the challenges posed by water. In Benin, the Government and other stakeholders are providing support to youth to get them involved in agricultural business. The support is provided in terms of access to land and capital. A positive outcome has been observed among young people who invest in small-scale irrigation. They have built small storage ponds to harvest rainwater during the wet season for use in the dry season. It provides them with the opportunity to diversify crops and produce in dry season. The availability of water throughout the year enables young people to develop multiple agricultural activities from gardening to fishing. On the other hand, it permits them to keep working even in dry season. As an example, they produce vegetables (especially tomatoes) in dry season that are up to 150% more profitable on local markets. By doing so, young people also reduce the various risks posed by climate variability and price instability.

Need to support the process

Focusing efforts on agricultural water management may help a lot in maintaining youth in agriculture. Private small scale irrigation systems may be the solution. But there is a strong need to support the process. First, the benefits of integrating agricultural water management must be highlighted to young people as a must rather than an option. Then loan capital and technical support can be provided to ensure technologies are well implemented and can add value. There is also a need to develop innovative financing mechanisms. These can be done through the support to rental markets.

Addressing agricultural water challenges is definitely a good option for attracting youth into agriculture and reduces their migration from rural areas. The process must be supported by all stakeholders and not considered as a holistic solution but an asset to support the agricultural value chain.

ACCESSING WATER IN THE CARIBBEAN REGION

Keron Bascombe,
YPARD Country Representative for Trinidad and Tobago and author of the blog "Technology4agri" http://technology4agri.wordpress.com/

Caribbean agricultural practices, unlike much of the developing world are multifaceted in the sense that farm management and water sources vary greatly. Farmers, many of whom are small scale producers have only themselves to rely on in ensuring water security for their enterprises.

Many hold rain fed lands which depend on constant precipitation levels. In the region there is the rainy season and the dry season, therefore farmers plant and harvest crops accordingly. However due to the full scale onset of climate change many have been forced to adapt as best as they can. Modern practices such as irrigation piping and rainwater harvesting are commonplace however as aforementioned these strategies vary.

For young dynamic farmers, fulfilling their water needs is a challenge due to the recurring issue of a lack of resources, which is further impeded by the absence of authority which in this case refers to the relevant government services which are partly responsible for remedying the situation. However those agri-youth of the sector rise to the challenge and purport a number of strategies to maintain their water supply.

A prime example in the Caribbean of security water can be found with Isaac Holdings Limited (IHL) a Modern Agriculture, Outdoor Maintenance & Estate Management Brand owned and operated by Atkin and Arvin Isaac, agri-entrepreneurs of Trinidad and Tobago. From IHL's perspective "rain water harvesting has been the core of our irrigation supply given the fact that the nearest pipe borne water supply is over a kilometre away."

Due to the enterprise's terrain and soil type (heavy clay) the owners have established three functional irrigation ponds allowing them to maintain a supply. "Though clay is known for its high water retention, at the height of the dry season the total opposite occurs with cracks as large as 3 inches forming a haphazard pattern across the surface" says Atkin. As a result, most of the water is lost, whether it be an intermittent shower during the dry season or irrigated water.

This particular issue is characteristic of an area in which IHL farms, which face severe challenges for short crops in particular, with long term crops such as banana and cassava seeming to remain unaffected. Support is available through government incentives which essentially subsidize the cost to "legitimate" (registered) farmers who dig irrigation ponds and drains, and establish watering systems using pvc piping or drip tapes.

That being said, the procedure to secure this subsidization is particularly arduous and time consuming. With proper documentation as it relates to land ownership being another major problem, along with poor administrative services, a high number of producers are unable to access this support.

Another avid farmer and youth in agriculture Alpha Sennon, explains his efforts and situation; "Although my farm land is located near to the main road, a water line has been established behind my home to where the farm is located. This water source originates from the government established waterlines to the community. However, this is only available two to three times a week. Therefore, two large tanks equipped with irrigation lines have been erected in order to ensure a constant flow of water to the land."

To support this source, Mr. Sennon built a dam that utilizes the terrain of his land so that it acts as a rain harvester, collecting water for manual application on short term crops. The next step is to facilitate a water pump for easier irrigation.

Another strategy lies in the restructuring of parts of the terrain of the land. He explains that part of the land was mechanically dug out and reduced below ground level meaning that when rainfall occurs the water is more easily collected by the land. This action supports his major activity of

dasheen production.

Alpha reiterates that as of present, "no government assistance has been given where irrigation is concerned, and that self investments were made to fulfil the requirements of the crops."

Based on these examples, it is clear that sourcing water is a dynamic endeavour and as expected a costly one as well. Despite this, many are unaware of these difficulties in that water security is an integral part of solving larger issues such as food security.

WORLD WATER WEEK STOCKHOLM 2013 1-6 SEPTEMBER 2013

The World Water Week is hosted and organised by the Stockholm International Water Institute (SIWI) and takes place each year in Stockholm. The World Water Week has been the annual focal point for the globe's water issues since 1991.

Every year, over 200 collaborating organisations convene events at the World Water Week. In addition, individuals from around the globe present their findings at the scientific workshops.

Each year, the World Water Week addresses a particular theme to enable a deeper examination of a specific water-related topic. While not all events during the week relate to the overall theme, the workshops driven by the Scientific Programme Committee and many seminars and side events do focus on various aspects of the theme. The theme of this year is Water Cooperation.
http://www.worldwaterweek.org/

WATER SCARCITY SEEN AS INCREASED THREAT TO U.K. AGRICULTURE PRODUCTION

Rising temperatures may increase risks for U.K. agricultural production as water supplies become more scarce in the next decade, said an independent adviser to the government on climate change.

The U.K. should improve irrigation efficiency and give farmers incentives to increase water-storage facilities in preparation for drier seasons, the London-based Committee on Climate Change recently said in a report.

A dry year in the 2020s might result in a water shortage of as much as 120 billion liters (31.7 billion gallons), equal to the amount farmers use now to irrigate crops in a typical year, it said.

"Much of the cropland in England is located in areas where water resources are already overstretched," the committee said. "These pressures are likely to grow from the combined effects of climate change and increased demand from economic and population growth."

Moreover, fertile topsoils are becoming eroded and are at risk of disappearing in the East Anglia Fens in the next few decades, according to the report. The group advised putting in place soil-conservation practices such as reduced plowing.
http://www.bloomberg.com/news/2013-07-10/water-scarcity-seen-raising-risk-to-u-k-agriculture-production.html

AGRIWATERPEDIA: A GLOBAL KNOWLEDGE PLATFORM FOR AGRICULTURAL WATER MANAGEMENT

Agriwaterpedia is a platform that represents a major step in closing the gap and a tool to discuss strategies and challenges related with agricultural water use on a global scale.

www.agriwaterpedia.info is intended to secure crucial knowledge with regard to agricultural water management in the context of climate change and food security and make this knowledge accessible to users worldwide.

www.agriwaterpedia.info provides practitioners and experts in development cooperation with approaches and good practices and draws data from experiences and lessons learnt from a variety of developing countries. It also contains a library with about 260 publications accessible as pdf files. Most of these publications have been written and compiled in the course of GIZ projects and are only digitally available on www.agriwaterpedia.info

NEW TECHNOLOGIES AIMED AT COPING WITH THE GLOBAL SCARCITY OF CLEAN WATER

Efforts to cope with a global water crisis that has already left almost 800 million people without access to drinkable water - and could engulf many more in the years ahead - are the topic of the cover story in the current edition of Chemical & Engineering News. C&EN is the weekly news magazine of the American Chemical Society, the world's largest scientific society.

The article describes innovative solutions that nevertheless are emerging. Nonprofit organizations and chemical companies, for instance, have developed and started distributing a handful of appropriate technologies. These range from simple boreholes to straws with built-in filtration systems. The technology is reaching people in rural villages around the world. Many individuals have benefited from these new technologies, which can be life-saving, but millions more are still in need, the story points out.
http://www.medicalnewstoday.com/releases/263922.php\

MADAGASCAR GETS GRANT TO BOOST WATER SUPPLIES FOR AGRICULTURE

Madagascar, the island nation off southeast Africa where the main staple is rice, will receive a grant to help support the agriculture industry and assure water supplies.

The $6.3 million grant from the Global Environment Facility Council to be channelled through the African Development Bank backs climate-resilience efforts in agriculture in the southwest region, the bank said.

The project will improve water supply infrastructure in the Bas Mangoky region, it is shown in a website statement.
http://www.bloomberg.com/news/2013-07-10/madagascar-gets-grant-to-boost-water-supplies-for-agriculture.html

ENSURING UNIVERSAL ACCESS TO WATER

Ensuring universal access to water and using it wisely in agriculture is essential to end famine, drought and political instability, United Nations officials stressed, adding that countries must strive to provide this vital source to all their citizens to achieve a sustainable future.

Especially, for smallholder farmers in developing countries, water and land cannot be treated as separate issues. If we are to reduce poverty in rural areas, we must develop a holistic approach to focus on water in all of its contributions to development such as in areas of health and agriculture.

Investments in water infrastructure, rural development and water resource management will be essential in the forthcoming years.
http://www.un.org/apps/news/story.asp?NewsID=41605#.Uf9R-KzWlHo

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WORLD FARMERS ' ORGANISATION