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INTEGRATED WATER RESOURCE MANAGEMENT FOR FOOD SECURITY IN AFRICA

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I. INTRODUCTION

1. World food production has increased significantly in the last 40 years and provided people with better nutrition, thanks mainly to irrigation combined with high-yield varieties, fertilizers and phytosanitary measures. However, hundreds of millions of people still suffer from hunger in the world, including a large number of Africans. Increased food demand, mainly driven by population growth, impels countries to increase their agricultural production by means of intensification and the expansion of cropland, especially irrigated cropland.

2. Agriculture is responsible for 70 percent of the world's water withdrawals and is therefore its primary consumer of water. Municipal needs account for 10 percent and industry 20 percent. The respective figures for Africa are 85 percent, 9 percent and 6 percent. Sub-Saharan Africa only uses 2.9 percent of its water resources.

3. Population projections and estimates of future water requirements indicate lower availability of water per inhabitant, which will exacerbate competition between irrigation and the other water-user sectors with growing needs.

4. On average, 40 percent of water withdrawn from rivers, lakes and aquifers for agriculture is actually used for crop production. The rest is lost in a variety of ways. Substantial water savings are therefore possible by improving irrigation efficiency and water productivity, and by adopting an integrated approach to water management. This was one of the recommendations to come from the Ministerial Round Table on the role of water and infrastructure for ensuring sustainable food security, held in parallel to the 32nd FAO Conference on 1 December 2003, in Rome.

5. This document reports on the current state of agricultural use of water for food security and outlines the generally fragmentary approach of national water policy. It reviews the principles

underlying integrated water resource management (IWRM) and shows that the objectives of food security can only be achieved, all other requisites being met, within the framework of IWRM.

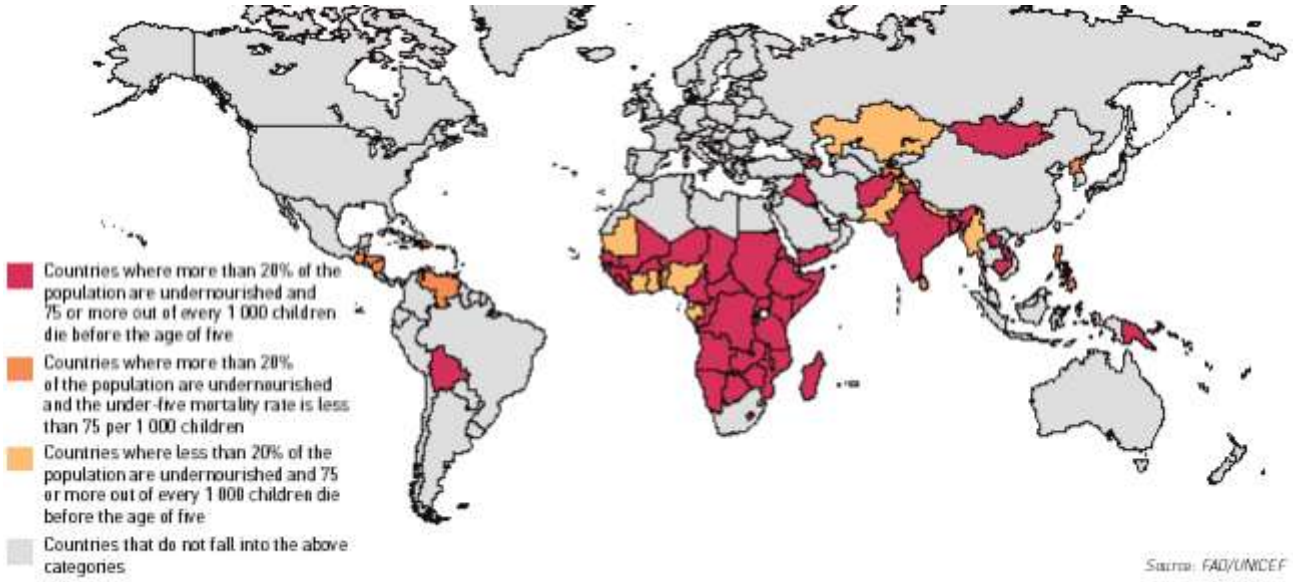
II. AGRICULTURAL PRODUCTION AND FOOD SECURITY

6. Agriculture is the main source of food. However, despite the significant increase in world food output in the past 40 years, there are still some 842 million people in the world who suffer from hunger, including 23 percent in sub-Saharan Africa and 60 percent in Southeast Asia (Figure 1).

7. The current world population of 6 billion is expected to reach 8.1 billion by 2030 and level out at 9.3 billion towards 2050. Africa's population will be about 1 billion. Such population growth will inevitably result in higher demand for food.

8. This increase in demand can be met by increasing agricultural yield, cropped area and cropping intensity. More than three-quarters of the increase in food production in recent decades has been due to higher yields and an expansion of irrigated area. Irrigation now accounts for 20 percent of agricultural land and 40 percent of crop production in the developing countries. Africa had 12.7 million hectares under irrigation in 2000, equivalent to about 7 percent of its arable land and one quarter of its irrigation potential.

Figure 1 : Map indicating percentage of undernourished population



9. We need to recognize that, with present investment in the control of water for agriculture, the objective of the World Food Summit (WFS) of halving the number of hungry people in the world by 2015 will not be achieved before 2150. Most encouraging in this regard was the commitment made by African countries at the meeting of African Union Heads of State and Government, in Maputo in July 2003, to raise to 10 percent, by 2007, the share of national budget allocated to agriculture and rural development.

10. FAO launched its Special Programme for Food Security (SPFS) in 1994 to help deal with food insecurity in low-income, food-deficit countries. The main purpose of this programme is to help countries improve their food security (Box 1) at national level – thanks to a rapid increase in food productivity and production and by reducing inter-annual variability of harvest – in an economically and environmentally sustainable way. The water control component of the SPFS seeks to promote the use of low-cost, effective technologies that are adapted to local conditions: water harvesting techniques, treadle pumps, etc.

BOX 1 : Definition of food security

According to the definition adopted by the World Food Summit (WFS) in Rome in 1996, food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. This means that a country should not only have sufficient food but that its inhabitants should have the means of purchasing it. The target set by the Summit was to reduce the number of people with food insecurity from 800 million, the estimate for 1995, to 400 million by 2015.

III. WATER RESOURCES

3.1. Water availability

11. Africa only has 5 000 m^3/inhabitant/year as compared to 24 000 m^3/inhabitant/year in the Americas and 9 000 m^3/inhabitant/year in Europe [2]. Moreover, its water resources are unevenly distributed (Figure 2). The Congo River alone accounts for 30 percent of the continent's runoff, while ten other major watercourses drain 50 percent of total runoff. The Sudano-Sahelian and Northern regions account for only 1.2 percent and 4.3 percent, respectively, of total renewable water resources.

Figure 2 : Map of water resources in Africa

Source [2]

3.2. Multiple uses of water

12. Africa's water resources are still little used. Less than 4 percent of its renewable water resources are withdrawn each year, half of this amount by the countries of the Northern region (Table 1).

a) Domestic use

13. Coverage of safe water requirements is still very low in Africa, despite increasing from 32 percent to 42 percent during the International Drinking Water Supply and Sanitation Decade (1981-1990). Withdrawals for domestic water supply account for 9 percent of the total, with the urban population better served than the rural population: 65 percent of the former having access to safe water against 25 percent of the latter [4].

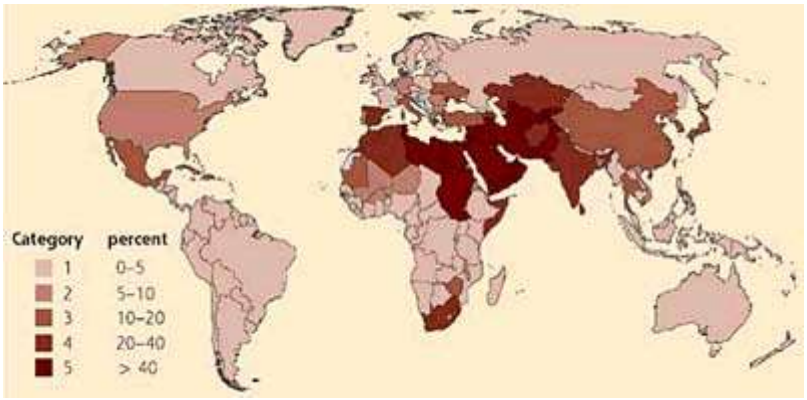
b) Agricultural use

14. The proportion of withdrawals for agriculture is higher in Africa (85 percent) than in the other regions of the world, but the level of withdrawal varies considerably from one part of Africa to another (Table 1). World withdrawals for agriculture average out at 70 percent. Only a small proportion of irrigation potential is actually realized in sub-Saharan Africa. Figure 3 represents water withdrawals for agriculture as a percentage of total renewable water resources.

Table 1 : Regional distribution of water withdrawals in Africa

Region	Internal renewable resources (km^3/year)	Water withdrawals				
		Agriculture $x10^6m^3$/year	Municipal $\times10^6m^3$/year	Industry $\times10^6m^3$/year	Total $\times10^6m^3$/year	As % of internal resources
Northern	50	65 000	5 500	5 800	76 300	152.6
Sudano-Sahelian	170	22 600	1 200	300	24 100	14.2
Gulf of Guinea	952	3 800	1 600	700	6 100	0.6
Central	1 946	600	600	200	1 400	0.1
Eastern	259	5 400	900	200	6 500	2.5
Indian Ocean Islands	340	16 400	200	20	16 620	4.9
Southern	274	14 100	3 000	1 800	18 900	6.9
Total	3 991	127 900 (85%)	13 000 (9%)	9 020 (6%)	149 920 (100%)	3.8
Sub-Saharan Africa	3941	99 400 (88%)	9 500 (8%)	4 400 (4%)	113 300 (100%)	2.9
Source : [5] et [6]						

Figure 3 : Agricultural water withdrawals as a percentage of renewable water resources, 1998



Source : FAO 2002, Crops and Drops

c) Industrial, hydro-electric and other uses

15. Industry uses an annual 9 020 km³ of water which corresponds to about 6 percent of water withdrawals. Only 4 percent of Africa's electricity is from hydro-power [7], which is less than 5 percent of potential [8]. Water is also used for tourism, fisheries and transport, which are non-consumer users (the water is returned to the water system after use).

IV. INTEGRATED WATER RESOURCE MANAGEMENT

4.1. IWRM: sources, principles and components

16. At the 1996 WFS, the Heads of State and Government set themselves the target of reducing the number of people living with food insecurity from 800 million to 400 million by 2015. In 2001, they set themselves the same deadline for halving the number of people without access to safe water. Such objectives can only be achieved under a IWRM framework [Box 2].

BOX 2 : IWRM principles and components

Consensus on IWRM was forged at the Copenhagen Informal Consultation on Development and Integrated Management of Water Resources (November 1991) and at the International Conference on Water and the Environment in Dublin (January 1992). But the underlying principles were spelled out in Dublin:

- Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment.
- Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
- Women play a central part in the provision, management and safeguarding of water.
- Water has an economic value in all its competing uses and should be recognized as an economic good.

These principles supported the main document on water issues discussed at the Earth Summit in June 1992 in Rio de Janeiro. It was at this Summit that the guiding principles of concerted action on the control and management of water resources were adopted by

all countries and set out in *Agenda 21*.

The Global Water Partnership's Technical Advisory Committee (GWP/TAC) defined integrated water resource management as a process which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital systems [9].

17. IWRM is now considered the most appropriate framework for "good water governance". Indeed, the water policy of many development partners and development financing institutions, including the World Bank, African Development Bank (ADB) and European Union, now stress the need for a global water policy framework, the decentralized management of services, the pricing of water and greater participation of stakeholders. In other words, integrated water resource management.

4.2. The present situation in Africa and the new need for IWRM

4.2.1. The water resource situation

18. Africa has wide variability of precipitation and heavy evaporation rates. The irregularity of rainfall over time leads to significant inter-annual fluctuations in waterflow and recurring droughts that can cause famine. Some African countries use more water than their renewable resources, the shortfall coming from fossil reserves. Many others withdraw more water than they have available on their national territory as they receive transboundary waters from other countries [2]. Most African countries share at least one international river basin (Table 2).

Table 2 : International river basins draining more than 30 000 km²

N°	Name of catchment basin	Basin area (x 1000 km²)	Countries sharing the basin
1	Congo	3690	Angola, Burundi, Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Rwanda, Tanzania, Zambia
2	Nile	2850	Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda
3	Niger-Benué	2230	Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger, Nigeria
4	Lake Chad	1900	Cameroon, Central African Republic, Chad, Niger, Nigeria, Sudan
5	Zambezi	1290	Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe
6	Orange Senou	800	Botswana, Lesotho, Namibia, South Africa
7	Lake Turkana	500	Ethiopia, Kenya, Sudan, Uganda

8	Juba-Shebelli	450	Ethiopia, Kenya, Somalia
9	Limpopo	400	Botswana, Mozambique, South Africa, Zimbabwe
10	Volta	390	Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Togo
11	Senegal	340	Guinea, Mali, Mauritania, Senegal
12	Okavango	320	Angola, Botswana, Namibia, Zimbabwe
13	Ogoue	220	Cameroon, Democratic Republic of Congo, Equatorial Guinea, Gabon
14	Ruvuma	150	Malawi, Mozambique, Tanzania
15	Awash	120	Djibouti, Ethiopia
16	Cunene	110	Angola, Namibia
17	Sabi (Save)	103	Mozambique, Zimbabwe
18	Gambia	78	Gambia, Guinea, Guinea-Bissau, Senegal
19	Sassandra	78	Côte d'Ivoire, Guinea
20	Comoé	77	Burkina Faso, Côte d'Ivoire
21	Baraka	60	Eritrea, Sudan
22	Cross	48	Cameroon, Nigeria
23	Oueme	48	Benin, Nigeria, Togo
24	Komati	46	Mozambique, South Africa, Swaziland
25	Pangani	35	Kenya, Tanzania
26	Maputo	34	Mozambique, South Africa, Swaziland
27	Cavally	32	Côte d'Ivoire, Guinea, Liberia
28	Gash	32	Eritrea, Sudan
Source : [7]			

4.2.2. Current management of water resources

19. Few African countries have so far drawn up a policy on global water use. Each subsector develops its own strategy, without heeding the needs of the others. This fragmentary subsectoral management of water is no longer acceptable in a context of rapidly increasing multifaceted demand and diminishing water resources. The current situation in most African countries is one of:

- absence of a clear water policy and associated strategies, an uncoordinated approach to water resource planning and management and absence of appropriate institutional, juridical and regulatory frameworks;
- insufficient understanding of water resources and

- insufficient mobilization of water for agricultural purposes to ensure food security and combat poverty and insufficient participation of beneficiary populations in water resource development and management actions;
- insufficient local expertise in water issues and insufficient public investment; and little effort to marshal the private investment that could significantly stimulate the sector;
- insufficient research and development activities for the mobilization and management of water resources (low-cost, sustainable technologies);
- problems of coordination between countries sharing watercourses, although umbrella organizations do already exist for some river basins (Table 3). Adopting an approach that demonstrates the comparative economic advantages of sharing the use of water in these basins as opposed to embarking on individual actions could encourage countries to opt for concerted management [10].

Table 3 : Main river basin organizations in Africa

N°	Name of catchment basin	Name of organization	Date of creation
1	Gambia	OMVG (Gambia River Basin Development Organization)	1967
2	Kagera	KBO (Kagera Basin Organization)	1977
3	Lake Chad	LCBC (Lake Chad Basin Commission)	1954
4	Mano	MRU (Mano River Union)	1973
5	Niger	NBA (Niger Basin Authority)	1963
6	Nile	TECCONILE (Cooperation Committee for the Nile)	1993
7	Senegal	OMVS (Senegal River Basin Organization)	1972
8	Zambezi	ZRA (Zambezi River Authority)	-
SOURCE : [7] In February 1999, TECCONILE became the Nile Basin Initiative (NBI)			

4. 3. Importance and implementation of IWRM

20. The IWRM principles should be used to shape the integrated national water policy that governments need to develop according to national specificities. This policy should dovetail with other policies that are associated with water use: agriculture, industry, energy, urban development, urban and rural infrastructure. The catchment basin should be considered as the logical geographical unit for implementation of IWRM and for management of natural resources for agricultural production.

21. Governments should put an organizational structure in place, with institutional, juridical and regulatory measures that will provide for:

- the involvement of civil society, the private sector and local populations in the process of water resource planning and the reorganization of public water utilities so that they have a regulatory role: the government then plays an arbitrator role, fully aware of all stakeholder views;
- the implementation of a rational legal framework and mechanisms for the settlement of disputes and the protection of waters from pollution and overuse;
- the economic valuation of water, which needs to be treated as an economic asset where it serves economic interests, without however neglecting the social dimension.

22. Enhancing national capacities for water resource planning, development and management is a priority. Skills in human relations (negotiation, leadership, communication, etc.) are as important as capital and information management skills. Policy success depends on this [11].

23. Regional frameworks need to be set up for neighbourly cooperation and harmonization of water policy and legislation. Riparian Countries should reinvigorate existing river basin organizations and set up new ones so that the IWRM principles can be applied, including those for the management of natural disasters. There are international examples of shared water use acting as a strong catalyst for enhancement cooperation among nations (Box 3).

BOX 3 : International cooperation around transboundary basins

The Senegal River Development Organization (OMVS) is a unique example in Africa where three riparian States have established common infrastructures for the coordinated management of a river basin's water resources. There are three conventions defining the institutional and juridical framework of cooperation among the three OMVS countries: the convention of 11 March 1972, establishing the OMVS and defining the status of the river; the convention of 21 December 1978 on the status of the shared infrastructure, and the convention of 12 May 1982 on the modalities of financing the shared infrastructure. In 2002, the OMVS was given a charter on the waters of the Senegal River which stipulates, among other matters, that all distribution of waters among the different uses is to be made on the basis of resource availability and inclusion of the following elements: (i) regional cooperation; and (ii) integrated water resource management.

4.4. Impact of IWRM on food security

4.4.1. Increased efficiency of water use

24. IWRM is based on the optimal use of water and associated resources. Efficient water use and reduction of avoidable losses will be crucial future objectives, whatever the sphere. As regards agriculture, techniques for the optimal use of water will be required for irrigated and rainfed farming alike. These will serve mainly to:

a) Improve the efficiency of irrigation and the productivity of water in irrigated agriculture

On average, only 40 percent of water withdrawn from rivers, lakes and aquifers has an actual impact on crop production. The remaining 60 percent is lost in a variety of ways (evaporation, canal leakage, overirrigation, etc.). Some of these losses are avoidable and much water could be recovered and reused. The great challenge for irrigated agriculture will be to increase harvests while consuming less water and operating under financial constraints, but technologies exist to make this possible. An FAO analysis of 93 developing countries

indicates that efficiency in use of irrigation water in the next 30 years will increase from 38 percent to about 42 percent on average [13].

This improved efficiency of irrigation and higher productivity of water in irrigated agriculture would release significant volumes of water that could be used to expand the irrigated area and to satisfy the other uses.

b) Improve water intake by rainfed crops

Rainfed agriculture is a high-risk venture, especially in semi-arid areas, but rain is very often the only source of water, so it needs to be used as effectively as possible. Tested and proven techniques for rainwater harvesting and retention of soil moisture need to be promoted and disseminated for adoption.

- The harvesting of runoff waters is done by microstructures installed for *in situ* water collection and storage [14]. These techniques increase and stabilize agricultural yields in semi-arid areas, providing three-to-fourfold increases in yield in Burkina Faso, Kenya and Sudan, for example [14].

- Techniques for the retention of soil moisture that are inexpensive and accessible to poor peasant farmers serve to reduce pressure on aquifers, to help the recharging of these aquifers and to reduce soil erosion. Niger, Burkina Faso, Sudan, Kenya and Tanzania have examples that have led to increased production and farmer income [14] and [16]. Examples also exist in many other countries, such as Brazil and Paraguay where these techniques have tripled net farm income and increased yields by between 6 and 14 percent [15].

4.4.2. Development and management of lowlands

25. Lowlands offer good opportunities for intensification and diversification associated with the greater availability of water. These areas are used to grow rice and vegetable crops and to graze animals in most parts of sub-Saharan Africa. However, the results are often modest because of the unpredictable hydrological behaviour of these agro-ecosystems. Developing and managing lowlands by introducing low-cost works for the partial control of water helps reduce land pressure on the higher-lying areas, where the risks of soil depletion are greater, and the filling of deep, narrow river beds. Lowland development needs to be a component of integrated watershed management.

4.4.3. Integrated management of land and water in catchment basins and environmental protection

26. By safeguarding the survival of ecosystems through the sustainable, integrated management of land and water resources, IWRM helps protect land and plant cover from degradation and waters from pollution, and mitigates the process of siltation of impoundments and sedimentation of rivers. It fosters the conservation and improvement of pasture productivity and a higher availability of the forest-based food products that FAO reports are important to 1.6 billion people in the world [13]. Moreover, the protection of humid areas safeguards their natural filtering function for the cleansing of wastewaters and the protection of biological diversity. IWRM helps avoid or reduce the drawbacks sometimes encountered with hydro-agricultural works, which can be the source of disease and environmental

problems. Some water-related diseases, such as malaria and schistosomiasis, are major scourges. Increased salinization of the soil, which is often due to poor water management, affects certain irrigated areas in arid regions, such as the Niger River Basin in Mali and the Senegal River Valley. Water pollution from agriculture is not yet a major concern in Africa, because of the low use of inputs. The waterlogging of irrigated areas which can be seen in most African irrigation schemes can result in significant loss of yield.

4.4.4. Conjuctive use of surface and groundwaters and reuse of wastewaters

27. IWRM advocates the rational use of different water resources, which can provide significant opportunities for the development of small-scale irrigation.

- The conjunctive use of surface waters and groundwaters is one way of optimizing water use over time. As the periods of greatest rainfall and maximum runoff do not always coincide with peak periods of water demand, part of the water can be stored in reservoirs and the soil. The two types of water resource need to be used compatibly to minimize the undesirable physical, environmental and economic consequences of using each separately.
- Some African countries (Tunisia, Egypt and Morocco) already reuse wastewaters after treatment [2]. Effluents from industrial, agricultural and domestic use can be rich in fertilizer and reducing their pollutant load enables a large proportion to be recycled for irrigation. However, wastewaters used for irrigation in most sub-Saharan countries are not treated. As they represent a major source of water for urban and periurban agriculture, their long-term impact on soil fertility needs to be studied.

4.4.5. Forecasting and rational management of water-related crises

28. IWRM also addresses the prevention and management of crises related to water (flooding, drought, pollution). Flooding, for example, often causes loss of crops and food stocks, the collapse of wells and the destruction of communication links [11]. Effective management of these crises can minimize their impact on harvests and food supplies, reduce negative consequences for other natural resources and help combat desertification.

4.4.6. Better knowledge of water resources and their uses

29. Good water management requires better organization of systems of collection, processing, storage and dissemination of data on water resources and use. Unfortunately, the water data collection systems in many countries of Africa are deteriorating because they lack funds for their maintenance and expansion. IWRM could help reverse this trend.

V. FINANCING OF WATER RESOURCE MANAGEMENT AND RURAL INFRASTRUCTURE

30. The water sector requires significant financing for irrigation, clean water supply, treatment of wastewaters, environmental protection and so forth. Most African countries cannot afford the required investment and the funds allocated by governments and development partners are insufficient and falling. Yet, Africa needs to develop its water resources and to expand its irrigated agriculture if it is to ensure its food security. Water development for agricultural production needs to be given a more strategic focus. Resources and interest need to be

mobilized for the accelerated development of rural infrastructure (roads, hydraulic works, etc.), the strengthening of research and extension capacity, and widespread farmer training in improved production, processing and water management techniques.

31. FAO has provisionally estimated that the current 14 million hectares targeted by investment in water control could be increased to 30 million by 2015. Such an increase would require a total investment of about US$ 37 billion. This estimate is based on a preliminary situation and needs analysis that will need to be validated by means of country assessments.

32. Investment in water and infrastructure can generally be done simultaneously at three levels: i) at the micro-level, the identification of solutions tailored to local realities calls for simple, small-scale and labour-intensive technologies, where possible; ii) at the meso-level, public investment should concentrate on modernizing existing infrastructure, improving water utilities and fostering an encouraging environment for private investment; and iii) at the macro-level, countries, with private sector partners where appropriate, should build an environment that will raise returns on investment in the agricultural sector. Such actions should be accompanied by:

- the encouragement of decentralized planning and implementation, involving user associations and private players in the integrated management of natural resources and, more specifically, water resources at catchment level;
- giving priority to the strategic rehabilitation, modernization and expansion of existing large-scale irrigation schemes, improving their technical and financial management. This will turn them into performing tools to advance food security and combat poverty;
- the promotion of small-scale irrigation based on low-cost technologies, water savings and/or the combined use of different types of water resource (surface water, groundwater and wastewater). These technologies should match the physical environment and should be within the reach of peasant farmers;
- the development, extension and use of innovative agricultural practices (including plot-level water management) that will result in higher agricultural production while, at the same time, safeguarding ecosystems and the natural productivity of the natural resource base;
- at river basin level, high priority to the integration of land-use and water-use planning, involving all user sectors: irrigation, hydropower, industry, municipalities, etc. Regional cooperation frameworks will need to be established for the sustainable and integrated management of water resources; water policies and legislation will need to be harmonized; and agreements on the management of shared catchment basins will need to be drawn up (Box 4).

BOX 4 : The ADB and Integrated Water Resource Management

The ADB, among others, has decided:

- to encourage and support the efforts of riparian countries to jointly define integrated water resource management strategies;
- to support multinational organizations and river basin authorities covering more than one country;
- to seek the general agreement of riparian countries on project proposals from one country on the use of shared water resources.

33. Under the New Partnership for Africa's Development (NEPAD), a combination of strategic public investment and associated private investment will be needed to ensure the required agricultural intensification and to achieve the objectives of numerous international summits to reduce poverty and enhance food security and economic growth. Investment in water control will have to be jointly conducted at the level of countries, subregional cooperation institutions and the continent. Countries will have to introduce public investment policies and ensure that the macroeconomic, policy and institutional framework is conducive to such investment. They will also have to promote private investment and provide the conditions needed to encourage official development assistance. The subregional institutions will play a key role in promoting investment in irrigation by developing subregional markets. Africa's experience in transboundary water management and in the functioning of river and lake authorities should be deployed in negotiating a satisfactory allocation of water resources between countries and sectors, while also heeding environmental considerations.

34. Finally, at the level of Africa as a whole, NEPAD should steer national public investment and official development assistance towards water control to ensure the strongest possible impact on poverty reduction and food security. It should ensure good integration of complementary public investment, notably in rural infrastructure (storage, transport, markets, processing, etc.).

VI. CONCLUSION

35. In contrast to demand for food, resources in land and water are finite so food security can only be envisaged within the framework of sustainable resource management. IWRM is a recommended strategic option for all socioeconomic development activities related to water. In an international context of increasing recognition of the economic value of water, the economic viability of agricultural investment in water can only be assured if the productivity of this resource is improved. For many countries in the world and notably in Africa, it is widely recognized that irrigation must be integral to any strategy to sustainably increase agricultural output in order to satisfy increasing food demand. Irrigation should therefore receive the means and investment required to increase its efficiency and the productivity of water. This will not only improve peoples' food security but will also release vast quantities of water for other uses. The best paradigm for such improvement is IWRM, an approach that has been designed to integrate the different water sectors on the one hand, and the different uses of water within each sector on the other hand. The WFS objective of halving the number of hungry by 2015 will not be attainable until 2150 if we continue with the present level of investment in water control for agriculture. NEPAD should thus direct its efforts on direct national public investment and official development assistance (ODA) towards the control of water in order to have the greatest possible impact on food security and poverty reduction. Partnership between the public and private sectors will have to be strengthened, and investments will need to be made more attractive and placed in a more long-term perspective.

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