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WATER RESOURCES DEVELOPMENT IN NORTH AFRICA

Summary of the Subregional Report

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* *This document, while also making use of other sources, summarises the preliminary version of the subregional report on water resources development in North Africa prepared by Dr. Bzioui Mokhtar, consultant and specialist in hydrology. The subregional report will be subjected to external review before it is finalised.*

I. CONTEXT AND PURPOSE OF THE SUBREGIONAL REPORT

1.1 Context

1. The increasing severity of water crises represents a real threat for sustainable development in the new millennium. The world is thus moving rapidly towards a situation where there will be a shortage of fresh water. The amounts of water used have increased more than six-fold over the last century, while the population has tripled over the same period.

2. If water use continues to increase at the same rate, by 2025 almost 5 billion of the 7.5 billion inhabitants of the planet will live in areas where it will be difficult to satisfy basic water needs.

3. The water crisis is admittedly due in part to the rapid increase in demand for water, but it is also due to poor water management, especially in developing countries.

4. Africa is a continent which possesses great possibilities, but it also faces great uncertainties concerning the exploitation and development of its water resources.

5. In fact, the continent possesses enormous potential. The Nile is the longest river in the world; the Congo is the second largest river in the world in terms of volume; Lake Victoria is the second deepest lake in the world and in addition to these, there are a number of other important waterways within the continent.

6. Africa contains more than 57 international waterways covering more than 60% of the continent. This means that there are hardly any large hydrographic networks which do not drain areas shared by at least two countries.

7. However, Africa also contains the largest desert in the world, the Sahara, lying north of the Equator. In addition, the continent contains vast arid and semi-arid areas, and it also suffers from repeated and prolonged periods of drought.

8. North Africa possesses considerable hydraulic potential thanks to the limestone plateaux of the Atlas mountain ranges and their snow cover. Underground potential is greater in the areas characterised by large deformations, the enormous aquifers in the Algerian and Tunisian Sahara and in Libya.

9. However, the cycles of drought which are continuing to beset the subregion at the beginning of this new millennium, combined with increasing desertification and the ensuing chronic water shortages, are causing still further deterioration in lands which are insufficiently irrigated and give poor yields.

10. One of the major challenges facing the countries of the subregion at the beginning of this millennium is thus that of achieving a judicious mobilisation and management of water resources, in order to ensure fair and sustainable water use for all. This is the appropriate moment to define a long term vision.

11. The project of drawing up a long term water policy was launched at the First World Water Forum at Marrakech in 1997. In 2000, the World Water Vision for 2025 was presented at the Second World Water Forum. Besides this global process, sector-based, regional and subregional visions have been drawn up. The African Water Vision for 2025 talks of "an Africa where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation and the environment"[2].

12. The United Nations inter-agency group for water in Africa (UN Water-Africa) is developing a mechanism for monitoring and evaluating the implementation of the African Water Vision. The process will lead to the preparation of the African report on water resources development, which will be published biannually from 2005. The sub regional report forms part of the preparation for the African report, and will thus also be published biannually.

1.2 Objective

13. This first edition of the sub regional report is intended to provide an evaluation of the progress achieved by the countries of the subregion towards the implementation of the African Water Vision for 2025. More particularly, it aims to:

(i) Set out the water situation in the countries of the subregion, with regard to potentialities and extraction;
(ii) Identify the critical problems posed by the competing needs, demands and uses and by water management;
(iii) Present case studies illustrating the successes that have been achieved and the constraints and difficulties encountered in implementing the African Water Vision for 2025;
(iv) Formulate recommendations for the procedures to be followed with regard to management and integrated development of the water resources of the subregion;
(v) Provide decision makers and technicians with a reliable source for water resource management in the subregion.

14. The empirical data gathered and analysed at national level have been incorporated into the sub regional report to form the contribution of the seven countries of the subregion[3]. The preparation of the national reports was entrusted to consultants from the countries concerned on the basis of the terms of reference drawn up for this purpose.

15. The main findings and conclusions of the preliminary version of the sub-regional report are summarised below for the twentieth meeting of the Intergovernmental Committee of Experts.

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2 *The African Water Vision for 2025, UN Water/Africa*
3 *Algeria, Egypt, Libya, Morocco, Mauritania, Sudan, Tunisia*

II. BACKGROUND INFORMATION ON THE SUBREGION

2.1 Physical settings and climate

16. The seven countries cover a total area of almost ten million square kilometres, of which Algeria and Sudan together make up more than half, Libya constitutes almost 20%, Mauritania, Morocco and Egypt make up equal parts of another 30%, and Tunisia constitutes only 1.7%.

17. The sub-region is bordered by the Atlantic Ocean to the west, the Mediterranean Sea to the north, and the Red Sea to the east. The relief is composed mainly of plateaux at altitudes of between 200m and 1000m. Mountainous areas make up almost 10% of the area, and are found mainly in Morocco, Algeria and Sudan.

18. Temperatures are very varied; they can fall below zero in the mountainous zones above 2000m and in the continental zones, while they can exceed 45° in the Saharan zones. However, temperatures are clement, at around 25°, in the coastal zones.

19. Rain is sometimes scarce over periods of several years, which makes it difficult to establish average rainfall figures, for there may also be torrential rains over a few hours in limited areas, with disastrous effects. The more humid Mediterranean area is subject to a Mediterranean type climate, characterised essentially by dry summers and rains distributed unevenly over the other seasons.

20. It can thus be seen that the region has an essentially arid or desert climate, which explains the scarcity of water resources, as we shall see below.

2.2 Socio-political and economic conditions

21. The sub-region is relatively sparsely populated, given the vast area it covers: 182 million inhabitants occupying almost 10 million square kilometres, giving a population density of 18 inhabitants per square kilometre. This characteristic is explained by the extent of the arid and semi arid zones, which are not conducive to human settlement.

22. The availability of water plays an important role in determining the distribution of the population, which is concentrated in the temperate zones which have sufficient rainfall for agriculture, situated mainly in the north of Morocco, Algeria and Tunisia. Concentrated populations are also found in the arid zones through which rivers flow, as in Egypt, North Sudan and along the River Senegal in Mauritania.

23. Egypt has the highest population (18%) and the highest population density (68 inhabitants per square kilometre) in the sub-region.

24. The countries of North Africa, despite great variation in per capita income, size and economic structure, share some common structural problems. From the end of the 1980s, many countries therefore embarked on ambitious programmes of economic reform aimed at restoring their macroeconomic balance and promoting the development of the private sector.

25. This led to a certain improvement in economic performance, which resulted in an average GDP growth rate of about 4% for the period 1995-1999, which stabilised at about this level for the period 2000-2004 (Table 1). Taking account of the population, this tendency was reflected in a 2.2% increase in the average per capita GDP of the sub region for the period 2000-2004.

26. Egypt faced a sharp decrease in the average GDP growth rate (it has fallen from 5.1% to 3.2%), because of recent monetary difficulties.

27. The sub-region remains characterised by large public sectors with centralised governments, which leads to fragility in the private sector, even though in certain countries (Tunisia) a real dynamic has emerged.

Table 1
Evolution of GDP growth rate

Country	**1995-1999**	**2000-2004**
Algeria	3.42	4.26
Egypt	5.12	3.22
Libya	1.52	2.28
Mauritania	2.04	4.26
Morocco	4.4	4.18
Sudan	4.92	6.1
Tunisia	5.52	4.54
North African sub-region	3.85	4.12

Source: ECA-NA, 2004

28. In any case, these countries, whose integration into the rest of the world is still limited in comparison to other developing economies in South and East Asia and Latin America, do not possess private sectors which are strong enough to cope with a large scale opening to European and world competition within the framework of the WTO.

29. Unemployment rates in the sub-region remain high (at around 15%), with women making up a very small proportion of the workforce. As is noted by the Arab Human Development Report (2003), published by the UNDP, much progress remains to be made in the fields of civil liberties and political freedoms, gender equality, and more generally in the development of human capacities and knowledge.

III. WATER POTENTIALITIES

3.1 Conventional water resources

A. Renewable water

30. The information gathered in the national reports, supported by that from the AQUASTAT FAO database, shows that the sub-region possesses a renewable water potential of 150 km3, but only 89 km3 are produced within the sub-region (Table 2)[4].

31. The 89 km3 of renewable water produced inside the sub-region are made up of 65m3 of surface water and 27km3 of underground water (the gap between the total amount and the sum of the volumes of surface and underground water results from the overlap between the two types of water).

32. Morocco and Libya are independent on outside sources for their water resources, while Algeria and Tunisia are dependent for only a small proportion of their water (3% and 9% respectively). However, Sudan, Mauritania and Egypt are heavily dependent on outside sources (77%, 96% and 97% respectively). A country's dependence on outside sources for its water resources is measured in relation to its water potential.

33. There are great disparities between the water potentials of the different countries. Egypt has a potential corresponding to 42% of the total potential of the sub region, which is twice as much as the potential of the four least well endowed countries (Mauritania. Algeria, Tunisia and Libya). Morocco and Sudan each have at their disposal a potential corresponding to that of the combined potentials of these four countries.

34. Apart from Mauritania, all the other countries of the sub-region have a water potential per inhabitant which is less than 1000m3, the level generally agreed to represent chronic hydric stress, and three countries (Algeria, Tunisia and Libya) have already reached the threshold for absolute hydric stress. Taking account of demographic projections up to 2025, it can be seen that by this date six countries will reach or are in danger of reaching the absolute stress threshold.

[4]*The global assessment of the sub region's water resources is made difficult by the differing levels of information, or even absence of information, from one country to another. Where the information exists, it is presented in terms of different concepts, which makes comparison between these countries difficult. Data missing from the national reports have been completed using the data base of the FAO on water resources, AQUASTAT.*

Table 2
Synthesis of water resources in the sub-region

COUNTRY	P	CP	IRW	IRUW	IRSW	TRW	POP	POT	DEP	VRW
	Mm	Km3/year	Km3/year	Km3/year	Km3/year	Km3/year	Million	M3/hab/year	%	Km3/year
Algeria	89	211.50	15.15	2.70	12.35	15.15	32	473	3	8
Egypt	51	51.37	9.00	7.5	1.50	63.00	68	926	97	49.7
Libya	56	98.53	0.60	0.40	0.20	0.60	5.6	107	0	0.635
Mauritania	92	94.66	0.40	0.30	0.10	7.40	2.7	2741	96	-
Morocco	346	154.68	29.00	10.00	22.00	29.00	30	967	0	20
Sudan	417	1043.67	30.00	4.00	26.00	30.00	33.5	896	77	-
Tunisia	313	51.26	4.85	2.15	2.70	4.56	10	456	9	3.6
Total		**1705**	**89**	**27.05**	**64.85**	**149.71**	**181.8**	**825**		

P: Average precipitations **CP**: Contribution of precipitations **IRW**: Internal renewable water **IRUW**: Internal renewable underground water
IRSW: Internal renewable surface water **TRW**: Total renewable water **POP**: Population size **POT**: Volume of renewable water resources/inhabitant/year **DEP**: Dependency ratio on outside water resources **VRW**: Volume of renewable water

B. Non-renewable water

35. Non-renewable water, also known as 'fossil water', generally consists of infiltrations of very ancient water, in climatic and morphological conditions different from the present ones, which are therefore outside the contemporary water cycle. A relatively large amount of the water which infiltrates into the ground reaches depths which make it inaccessible; it is then protected from the phenomenon of evaporation and can thus be preserved even across whole geological eras.

36. The inadequate quality and quantity of the information provided by the national reports reflect an imprecise knowledge of the potential renewable water reserves. These resources are nevertheless often excessively exploited. Libya is a striking example; this country has recourse to mining in extracting 90% of its underground water supplies (Water Resources of the Near East Region, FAO, 1997).

3.2 Non conventional water

A. Desalinated water

37. Counting brackish water and sea water, the subregion has at its disposal a desalination capacity of about 1,410,000 m3 per day.

38. The production of fresh water through desalination is still very expensive, and for this reason it is not much used except in the Middle East, where this water resource is often the only alternative, and also because of low energy costs and the wealth of the countries which use it.

39. In terms of the production of water by desalination, the Middle East has a production capacity equivalent to three times the production of all the other parts of the world. The production capacity of Africa is at an intermediate level, at around one tenth the capacity of the Middle East. The subregion provides 70% of this capacity, which is largely contributed by Libya (see Table 3).

40. With a production capacity of 700,000 m3 per day, Libya ranks seventh among the countries which produce fresh water by desalinating sea water. There is every reason to believe that Libya will continue to invest in this method of producing fresh water, given the very limited supplies of conventional water which are available to the country.

Table 3
Desalination capacity by country

	Mauritania	Morocco	Algeria	Tunisia	Libya	Egypt	Sudan	Total
Production Capacity (m3/day)	0	100,000	340,000	70,000	700,000	200,000	0	1,410,000
%	0	7	24	5	50	14	0	100

B. Water produced by treatment of waste water

41. The progress of the countries of the subregion in the domain of water production by treatment of waste water varies from insignificant to very advanced, depending on the country. This water is generally used for watering and irrigation.

42. Mauritania possesses a single waste water treatment plant, with a treatment capacity of 2000 m3 per day. In Morocco, around 70 million m3 of waste water are reused each year. In Algeria, where 45 purification plants have been set up to produce 484M m3 of treated water, only 14 plants are actually operative. In Tunisia, 150M m3 of waste water is treated annually. In Egypt, the waste water treated and reused at present amounts to 700M m3. Libya treats and reuses about 100M m3 of waste water per annum. In Sudan, the only experiment in using water produced by treating waste water was apparently in the 50s, and this was later abandoned.

43. Overall, water is undeniably a strategic factor for growth in North Africa. It requires collaboration between the different countries and long term planning. This implies greater coordination between the policies of the various countries, in accordance with the African Water Vision for 2025. For the moment, the Moroccan government is continuing to invest in small and medium scale hydraulics, whereas Algeria is following a policy of creating large dams, and Libya has started carrying out huge drillings in the vast Albian aquifer which lies beneath the Sahara[5].

[5] World Bank (2003), Sectoral Note on 'The Environmental Sector in the Middle East and North Africa', August 2003.

IV. NEEDS, USES AND DEMANDS

44. Demographic growth, rapid urbanisation and changes in lifestyle have led to an increasing demand for clean drinking water in the subregion. Real competition for water has developed, which will require a more rigorous management policy aimed at greater savings, better management of the harnessing of underground water, more and more long distance transfer of water, the recycling of waste water, etc.

4.1 Water, communities and cities

45. Meeting the basic needs of the populations, especially the 'sustainable access to safe drinking water and basic sanitation' is clearly cited among the 'Millennium Development Goals' (Goal 7, Target 10).

46. Access to drinking water: It is difficult to compare rates across countries since the indicators used may vary: the water supply may be provided by public hydrants or by individual installations; the per capita water supply may vary greatly from one country to another, and even from one region to another within the same country; the potability of water is defined in terms of quality standards which may vary from country to country, but also from one region to another within the same country when salinity is concerned; and so on.

47. In Mauritania, the only figure given for the percentage of population with access to drinking water in the national report is that of 80%, which is predicted for 2010. In Morocco, the production capacity for drinking water for urban areas increased fivefold between 1972 and 2003, reaching a flow of 55 m3/s of drinking water. The rate of access to drinking water is 88% in cities, whereas it does not exceed 55% in rural areas. In Algeria, the rate of access to drinking water, at the national level, is estimated at 97.7%. In Egypt it is estimated that 90% of the urban population and 70% of the rural population had access to drinking water in 1995. The big cities such as Cairo, Alexandria, Port Said and Suez are said to have 99% access to clean water, whereas the rate is said to be 90% in the urbanised areas of Upper Egypt. In Sudan, 70% of the urban population and 50% of the rural population are estimated to have 'adequate' access to clean water.

48. Access to sanitation (evaluated in terms of the rate of connection to the waste water disposal system): the sparse data available in a few of the national reports indicate that this is generally available only for the collection and evacuation of waste water in cities, this basic service being practically nonexistent in rural areas of the countries concerned.

49. Moreover, the rate of connection in large towns has apparently been decreasing since 1992. This situation can be explained by the fact that the suburbs of large towns are sometimes occupied by unregulated housing where this basic service does not exist, and that this phenomenon is expanding despite the governments' attempts to regulate informal housing.

4.2 Water, agriculture and food production

50. Water has made possible the development of agricultural programmes intended to promote food production in the subregion and extend the rate of cover of basic production needs in the countries concerned.

51. In Mauritania, 77% of the country's need for rice has been met since 1977. In Morocco, the rates of coverage for the production of three basic foodstuffs (cereals, oil and sugar) are estimated at 50%, 35% and 35% at present. In Algeria the major food production, cereals, varies depending on climate fluctuations; it ranges from 9 million quintals (1994 and 1997) to 50 million quintals (1996). In Tunisia the irrigable areas (7% of the arable land) contribute 30% to 35% of the value of agricultural production, providing 80% of the needs of the local market in fruit and vegetables and contributing 10% of the value of exported foodstuffs.

52. The agricultural programmes set up in the subregion depend essentially on irrigated farming, and the volume of water has, according to the country, been determined by water availability (Mauritania), a voluntarist policy of dam building (Morocco) or climate fluctuations (Algeria).

53. The arable land in Mauritania represents barely 1% of the country's surface area, and the potentially irrigable area does not exceed 220,000 ha, concentrated in the south of the country. The area currently irrigated amounts to 40,000 ha. Flood recession cultivation is carried out over 25,000 ha.

54. In Morocco, the area under irrigation is at present 1,050,000 ha, or almost 35 ha per thousand inhabitants, compared with the world average of 43 hectares per thousand inhabitants. Although representing no more than 10% of the useful farming land, the irrigated area contributes on average about 45% of the value added agriculture and provides almost 75% of exported foodstuffs. This contribution to the value added may reach 75% in years of high rainfall.

55. In Algeria the area under irrigation is about 454,000 ha, or 5.24% of the useful area. Within the large irrigated areas (100,000 ha), only 40,000 ha have been irrigated on average over the last twenty years.

56. In Tunisia, agriculture is the major consumer of water, the quantity of water allocated to the irrigation sector being estimated at 2 billion m3 per year, with an irrigable area of nearly 400,000 ha. At present the irrigated sector contributes 30% of the value of agricultural production, 10% of the value of agricultural exports and 27% of agricultural jobs.

57. In Egypt, all agriculture uses irrigation, given the scarcity of rain. The irrigated areas, almost all based on the Nile, increased from 5M ha to 5.37M ha from 1994 to 1995 and then remained stable at a level of around 5.4M ha for seven years, before increasing successively to 5.54M ha and 5.82M ha during 2002 and 2003.

58. In Sudan, 20% of the arable land is cultivated (16.8M ha out of a total of 84M ha), and only 1,884M ha are irrigated. Irrigated farming consumes 19,000M m3 of water.

4.3 Water, Energy and Industry

59. In Mauritania, industries consuming large amounts of water are relatively rare (the SNIM which exploits iron, the SOGEM soap factory, and the cement works) and do not have a great impact on water consumption. Water consumption in industry is estimated at 4% of the global consumption.

60. In Morocco, with an installed capacity of about 1200M W, that is about 32% of the total power, the power plants attached to the dams allow the production of an average of more than 2,000 million kWh in an average hydrological year. In the industrial sector, water needs are handled along with the needs for drinking water, most industrial activities being concentrated in the big cities. The problem of water for industry is thus not perceived as a problem of supply, but as a problem of rationalising water use and a problem of pollution.

61. In Algeria, out of 50 dams in use, thirteen produce hydroelectric power, together yielding 269.2M W. The consumption of water by industry is about 60 million m3. Some industries use their own wells, apparently able to mobilise a similar volume of water (60 million m3 per year).

62. In Tunisia, out of the 27 large dams in use, 4 are used to produce energy; the overall installed capacity is 58.66M W. The demand for water in the industrial sector was estimated at 101 million m3 in 2000 (representing 4% of the total demand), 32 million m3 of which are provided via connection to the SONEDE network and 69 million by their own resources. This demand is satisfied by 18 million m3 coming from surface water and 83 million m3 coming from underground water.

63. In Egypt, hydroelectric energy, produced at the Aswan dam, has been considered as a sub-product of the other uses of water (irrigation, drinking water) since the 1980s (drought). A vast programme for producing thermic energy has been launched to make up for the lack of production of hydroelectric energy. The power stations draw about 10,700M m3 from the Nile for their refrigeration needs, but after being used this water is returned to the Nile. Most industries also take their water needs directly from the Nile. After being used this water is put back into the Nile. Apart from a small amount lost by evaporation, the quantity of water is thus conserved, but the water is returned to the river in a polluted state. The amount of water taken from the river for industrial purposes was estimated at 7,500M m3 in 1999/2000.

64. In Sudan the installed capacity of hydroelectric is 335M W out of a total capacity of 1200M W. Sudan is estimated to possess hydroelectric potential of 5,000M W for a production of 45,000 GWh.

V. WATER, ENVIRONMENT, BIODIVERSITY, ECOSYSTEMS AND IMPACT OF PEOPLE

65. The degradation of the environment and the pollution of water resources by people are increasing in the subregion because of several factors, in particular: population growth, changes in the people lifestyles, industrialisation, the increasing use of fertilisers and phytosanitary products in farming, and the fact that in the programmes to develop water resources little importance is placed on the protection of the environment.

66. The major ways in which mankind has affected water resources in the subregion, as cited in the national reports (without the evaluations which would allow their effects on water resources to be measured) can be summarised as follows:

- The extraction of surface water reduces the flow downstream from the site where it is extracted (reduction in the quantity of water and modification of the physical condition of the river bed), while extraction of water from the aquifer has an impact on the aquifer itself and its up welling;
- Poorly regulated urbanisation may be the cause of obstacles in waterways, modifying their paths and causing human losses and material damage;
- Unsuitable agricultural methods and land clearing in the catchments increase the speed of the water flow and cause it to be loaded with solid material, which increases the intensity of floods and reduces the water storage capacity of the reservoirs.

67. Available data indicate that the environment in Morocco is at present in an advanced state of degradation (almost 10% of the aquatic fauna is thus endangered). The degradation of water quality has also intensified, which is certain to have an effect on biodiversity and the ecosystems. With regard to the restoration of water quality, a vast action programme, the 'Schéma National d'Assainissement Liquide' (National plan for liquid waste disposal) has been set up, but is facing financing problems.

68. In Egypt, the Nile downstream of the Aswan dam is subject to all kinds of pollution, but it is not possible to evaluate the impact of this on ecology because of, on the one hand, the absence of water quality measures, and on the other hand, the lack of indicators of the evolution of environmental conditions. At the very most, the national report indicates that the total volume of liquid discharged into the Nile is estimated at 3,500M m3, of which 1,600M m3 is treated, and that by 2017 a further 1,700M m3 will be treated.

69. In Sudan, the annual rate of deforestation is believed to have exceeded 500,000 ha over the last three decades, whereas only 30,000 ha have been replanted. A large number of animal species have been lost over the last three decades, mainly because of the armed conflict in the south. Plant species have disappeared because of overgrazing, droughts and repeated fires. Fires are responsible for the loss of 30% of dry forage every year.

VI. SHARING WATER RESOURCES

▪ Mauritania and the other countries on the River Senegal

70. The management of the waters of the river Senegal, which is the major water resource of Mauritania, is the responsibility of the Office for the Exploitation of the River Senegal (Office de Mise en Valeur du Fleuve Sénégal: OMVS), which is a body set up by the countries which share the waters of the River Senegal (Senegal, Mauritania, Mali).

71. The River Senegal is divided into four hydraulic sectors starting from the hydrological control works at Bakel, upstream in Senegal. The management companies SOGED and SOGEM (subsidiaries of the OMVS) collect data every day on the level and rate of flow at two dams and ten hydrological control works, and provide instructions for the operating of the works at Manantali (Mali) and Diama (Senegal).

72. The operation of the floodgates situated on the dykes along the river is also carried out by the OMVS at the request of the bodies in charge of irrigation of the countries concerned, which are the SONADER (in Mauritania) and the SAED (in Senegal).

▪ Morocco - Algeria

73. The shared surface waters are estimated at 200M m3 flowing from Algeria to Morocco, and the same volume flows from Morocco to Algeria. These shared water resources have not yet been the subject of a sharing agreement between the two countries, but an official partnership has been set up in the shape of joint technical commissions for the exchange of information and experience concerning the mobilisation and management of water resources in the border basins. These commissions take action when necessary to resolve urgent problems.

▪ Algeria - Tunisia

74. The flow of surface water from Algeria to Tunisia is estimated at 300M m3, while that in the other direction is estimated at 183M m3 (the Tunisians' estimate), or at 153M m3 (the Algerians' estimate). Between Algeria and Tunisia there has long been an official partnership in the form of joint technical commissions for the exchange of information and experience concerning the mobilisation and management of water resources in the border basins. These commissions take action when necessary to resolve certain urgent problems.

▪ Algeria - Tunisia - Libya

75. Algeria, Tunisia and Libya share the exploitation of the groundwaters of the North Sahara Aquifer System (SASS), which over recent decades have seen their exploitation increase from 0.6 to 2.2 billion m3 per annum.

76. This system involves the superposition of two major deep aquifer layers, the deepest formation of the Intercalary Continental (IC) and the Terminal Complex (TC). It contains large stocks of water which are largely non renewable and are not totally exploitable; it poses a number of risks, including those relating to the degree of salination, reduced artesianism and drying up of outlets.

77. The Saharan Aquifer System extends over about a million square kilometres, distributed between Tunisia (80,000 km3), Algeria (700,000 km3) and Libya (250,000 km3). The current exploitation programme has reached 2.2 billion m3 per annum: 1.33 billion in Algeria, 0.55 in Tunisia and 0.33 in Libya.

- **Egypt – Sudan and the other countries along the Nile**[6]

78. In 1997 the World Bank, the UNDP and the CIDA began to work together as 'cooperation associates' in order to facilitate dialogue and cooperation between the states bordering the Nile, creating a climate of confidence in which a mechanism for joint work could be established.

79. In 1999 the Nile Basin Initiative (NBI) was set up in Dar es Salaam in order to prepare the groundwork for a new era of cooperation between the states bordering the Nile. The major objective of the NBI is 'to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile basin resources'. The ten countries concerned by the Initiative have thus set in place a permanent body responsible for evaluating and monitoring measures taken for the coordination of the management of the Nile's water resources.

[6] Burundi, Egypt, Eritrea, Ethiopia, Kenya, Uganda, Rwanda, Democratic Republic of Congo, Sudan, Tanzania.

VII. OVERVIEW OF PROGRESS AND PERSPECTIVES

7.1 Mobilisation and use of water resources

80. In Mauritania, the water resources are mainly surface water. The surface waters are estimated at 7.1 km3, and 54% of them are mobilised (3.75 km3). Given the very limited role of underground water resources, this figure can also be taken to represent the overall rate of mobilisation. Out of the 3.75 km3 mobilised, Mauritania uses only 1.3 km3, meaning a rate of use of 17.5%.

81. No evaluation has been made for the long term mobilisation of water resources, but current perspectives suggest that in 2025 the country will have water resources which are quite sufficient to meet its needs.

82. In Morocco, the surface waters mobilised at present are estimated at 10.75 km3 out of 16 km3 which are exploitable, which represents a mobilisation rate of 67%. Underground water is mobilised at a rate of 67% (2.7 km3 mobilised out of 4 km3 of renewable water), but in fact we must consider a mobilisation rate of 100% to take into account the overexploitation. Overall the exploitation rate of water resources amounts to 67% (74% if we take account of the overexploitation of underground water).

83. Current perspectives suggest that the balance between water needs and water supply will be maintained until 2030, by means of measures such as transfers from regions with a surplus of water to those with a shortfall, water economy measures, programmes to reduce pollution, and the use of non-conventional water sources in arid zones.

84. Algeria has apparently mobilised 100% of its renewable underground water, if we consider the figure put forward for the total amount withdrawn, which is 3.3 km3. The country is said to have 12.4 km3 of potential surface water at its disposal, which, if we take account of the volume mobilised by the dams (1,598 Km3), suggests that the rate of mobilisation of surface water is very low. It could be estimated at between 16% and 24% if we add the quantities of water mobilised from running water, which means an overall volume of mobilised surface water estimated at between 2 and 3 Km3. The total water resources (15.2Km3) would thus appear to be mobilised at a rate of only 20 to 26%, or 5.8 to 6.8 Km3.

85. Algeria will thus have to commit itself to large scale investments to complete the mobilisation of its surface water, and complement this with non-conventional water resources, in particular through desalination of sea water.

86. The water reserves of Tunisia are at present slightly surplus to its needs, since it has mobilised 94% of its underground water resources and 90% of its surface water resources, giving an overall mobilisation rate of 92%.

87. Taking account of the imbalance which will soon arise between renewable water resources and water needs, Tunisia will in future have to rely more and more on the use of non-conventional water resources, and will have to be vigilant in managing demand.