

Integrated Water Resources Management Policies in Sudan
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ABSTRACT: (9 pt) Water resources in Sudan, as presented in the paper, comprise three main categories, the surface water which contains rainfall and Wadis (seasonal non-Nilotic streams) waters, and the Nile system; groundwater and the unconventional water. The Sudan shares the Nile waters with ten countries, the Wadis waters with three countries and groundwater with three countries. The paper discuss the realities of the water resources situation in Sudan and the serious challenge that face the water resources management sector. Also the paper present the main functions of the Ministry of Water Resources in Sudan. At the end the paper presents the extent to which Sudan has been able to create an enabling environment for water resources management. This involves developing and implementing the policy, planning, and legal framework needed for guiding and coordinating water resources management, development, and use.

1. BACKGROUND

Integrated Water Resources Management (IWRM) is viewed 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 ecosystems.

Water is increasingly becoming a scarce resource due to the increase in population, industrialization and agricultural practices which are all putting stress on water. In order to meet the challenges imposed by water scarcity, existing water management systems must change drastically.

This report addresses the level of implementation of Integrated Water Resources Management in Sudan as part of a regional assessment to come up with comprehensive understanding of the current status and recommendations for improvement.

This paper is organized to discuss problem from a global perspective and tie it to the particular cases experienced in the Nile Basin countries. The status of water resources management in the country including policy, legal, institutional frameworks, and the concept of IWRM as understood in country, and the implementation status were discussed.

The paper revealed that the IWRM concept is fairly well understood in the country. It was also seen that the policies and legislations are scattered over the different water sectors and there is clear lack of coordination between these sectors. A quick look at the institutional frame work showed that it used to comprise a rather fragmented structure, not coordinated and with conflicting responsibilities and mandates.

2. WATER RESOURCES MANAGEMENT

The realities of the water resources situation present a serious challenge to water resources management well into twenty first century. Despite the problems associated with water development,

pressing needs for food, energy, and domestic and industrial water supplies require that surface and groundwater resources be used much more effectively than at present. The challenge for water uses, planners, policymakers is how best to achieve such development to contribute effectively to meeting social and economic goals, while maintaining water resources on a sustainable, high-quality basis, and avoiding serious degradation of the physical environment and unacceptable social disruption. A short, more general definition is:

- Analysis, evaluation and planning of future course of management action.
- Provision and enforcement of laws and regulations,
- Production and allocation of water,
- Provision of information to water uses activities.
- Provision of incentives to improve water use.

Monitoring collection of data on the performance of the water resources and its use.

3. WATER RESOURCES AVAILABILITY

Sudan is the largest country in Africa, covers an area of about 2.5 million km² between latitudes 30 N and 23° and longitudes 21° 45'' and 38° 30'' E. It borders nine countries and shares surface and groundwater with 12 countries. It has a population of about 40 million (2008 Census) with an annual increase 2.8%. More than half that population lives in areas away from the Nile.

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Rainfall in Sudan is generally characterized by its variability and it varies according to four distinct zones, namely:

1. the desert zone (comprising about 36% of Sudan's land area);
2. the semi desert zone (comprising about 20% of the land area);
3. the low rainfall Savannah zone (comprising about 24% of the land area);
4. the southern part (equatorial forests, high rainfall savannah, flood plains and swamps where average annual rainfall exceeds 900 mm, about 20% of land area);

The Nile Basin is shared by ten riparian countries, namely: Burundi, D.R. of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda. The hydrology of the Nile and its tributaries is summarized in Table 1.

Table 1 Supplies from the Nile and its tributaries

Tributaries	Total Annual Average Supply (BCM)	Flow Characteristics
Blue Nile	50.7	Average daily peak discharge falls from 535 mcm/day in August to only 11 mcm/day in April.
Rahad	1.09	Flow from July to November.
Dinder	3.0	Flow from June to November.
White Nile	27.8 (@ Malakal)	Daily flow falls from 114 mcm/day in November to 54 bcm/day in April.
Bahr El Gazal	14	Only 0.5 bcm reaches Malakal (swamps).
Bahr El Jebel	26 (@ Mongalla)	Flows range from 8 mcm/day in April to 66 mcm/day in November

Sobat	13.3 reaches Malakal	Low regulated flows from February to June.
Atbara	12 (7 from Setit and 5 from Atbara)	Average daily peak flow of 690 mcm/day (Aug-Sep).
Main Nile	84 (@ Aswan)	

The average annual flow of the Nile recorded at Aswan in southern Egypt, 84 bcm, is shared by Egypt (55.5 bcm) according to the 1959 Nile Water's Agreement between the two countries, 10 bcm are estimated to evaporate from the Aswan High Dam reservoir, built according to the above agreement. The agreement also established the rights of the other riparian countries for the utilization of the Nile Waters.

3.1 Surface Water Policy

- Foster conjunctive use of surface and groundwater as an efficient and sustainable water resources development and management option to augment the high cost of pumping groundwater from deep levels.
- Recognize that surface water development, utilization, promotion and conservation go hand in hand and ensure that irrigation and drainage, hydraulic structures, watershed management and related activities are integrated and addressed in unison.
- Surface water planning and development must be integrated with land use management at all levels.
- Management of surface water shall insure social equity, economic efficiency, system reliability and sustainability norms.
- A reliable data base and information system is a pre-requisite for sound assessment, planning, management and development of surface water resources.
- The operation and maintenance of surface water systems should be based on cost recovery – the user pays principle.
- The storage capacity in rivers, Wadis and rainwater harvesting vessels has to be increased to meet the increasing demand of water.
- Optimum, reasonable and equitable use of surface water should be promoted through cooperation between and within the States in national and local waters.
- The Government has a regulatory function to ensure that the appropriate standards of service quality, sustainability and environment friendliness are met by the water suppliers and users.

3.2. Wadis Water

Gash and Baraka are the largest Wadis, each with annual average flow ranging from 200 to 800 mcm, which occurs between July and September. These Wadis originate from Eritrea and terminate in the continental deltas of Gash, Toker and Red Sea. Wadi Azum and Wadi Hawar are the largest Wadis in western Sudan, with an estimated annual runoff of 500 to 750 mcm, respectively. The combined total annual runoff of all the Wadis in Sudan is estimated to vary from 5 to 7 bcm.

3.3. Groundwater

Groundwater investigations and development in Sudan are still embryonic. Given the size, complexity and cost of groundwater investigations, information on availability of groundwater resources in the country as a whole is sketchy. Renewable groundwater estimates are within 4 bcm. Groundwater is found in Nubian Sandstones, Umm Ruwaba formation and alluvial deposits. Basement Complex formations, despite their impermeability nature, may also contain groundwater in fractured or weathered zones.

3.3.1 Groundwater Policy

- Groundwater resources are an indivisible part of the hydrological system, the national water balance and the natural resources base.
- Groundwater resources are a national poverty, the equitable use of which is common to all subject to national authority and control.
- Present and future water users have a right of access to clean and unpolluted groundwater resources and un-degraded environment.
- Groundwater abstraction, particularly from alluvial and shallow aquifers, shall be based on recharge and safe yield concept.
- Sustainability of groundwater development, investment and supply services shall be planned for and considered as part of development and management policy of the water resources systems.

4. PRESENT AND FUTURE USAGE OF WATER

Irrigated agriculture is by far the major user of water in Sudan. The main crops grown are cotton, sorghum, groundnuts and wheat. It consumes more than 90% of the water. Human and animal consumption are estimated at 5% where the consumption for the industrial sector and other uses are estimated at 1%.

5. THE ROLE OF MINISTRY OF WATER RESOURCES

All water affairs are now under one umbrella – MOIWR. Its main functions are:

1. assessment of the water resources by compiling information and data for analysis and evaluation,
2. Formulation of policies for the use of water resources and review and update such policies according to new developments,
3. Preparation of new water resources development projects, evaluation of the engineering designs prepared by non governmental agencies and issuing of technical approval and supervision for implementation,
4. Conducting hydraulic research, as well as systems analysis, flood control and sedimentation studies,
5. Assessment, formulation and development of national plan for irrigation,
6. Operation and maintenance of dams,
7. Development of irrigation systems, operation and maintenance of large irrigation schemes,
8. Development of regional and international cooperation in the various aspects of water resources and irrigation development activities.
9. Development of training activities for the different skills in irrigation and water resources management.

6. INSTITUTIONAL DEVELOPMENT

Historical Milestones:

- Colonial era 1913 (Sennar dam and Gezira scheme)
- Nile water policies and plans during the period 1952-56
- The 1959 Nile Waters Agreement; followed by Master Plan of the Nile Waters which was prepared in 1978/1979
- In 1992 the Ministry Of Irrigation and Water Resources (MOIWR) embraced all the sub-sectors
- Federal System under New Constitution in 2005

6. INSTITUTIONAL FRAMEWORK

Federal Level:

- The Ministry of Irrigation & Water Resources (Policy, Planning, Transboundary

States Level:

- Implementation, service provision

7. OPPORTUNITIES

- 2 00 million acres of arable land suitable for irrigation & rain-fed agriculture
- Hydropower in Nile and tributaries, of more than 81000 GWh/year
- Navigation in water ways in main Nile and tributaries
- Potential to reclaim significant amount of the Nile water lost in the Sud area
- High potential of GW exploitation in arid and semi arid areas
- Potential to increase HP generation through regional cooperation
- Long sea shore for recreation and tourism
- Potential in Red sea, sea animal life, reservoirs and water channels for rare aquatic resources and fisheries.
- Cooperation with neighboring countries would result in win-win projects for the benefits of all and improve conditions in watersheds

8. CHALLENGES

- Natural Challenges
- Technical Challenges
- Economic Challenges
- Institutional Challenges
- Efficient and economic use of water resources.
- Institutional framework for water related sectors.
- Investment & Funds for sustainable management of water resources.
- Human and institutional capacities in WR.
- Participation of stakeholders.
- Water resources pollution risks and related environmental issues.

9. REGIONAL WATER AND INTERNATIONAL ISSUES

- To establish collaboration and cooperation mechanisms allowing for shared water wide approaches in management of international water resources to the benefit of all riparian:
- Improve collaborative IWRM by incorporating interests of trans-national stakeholders,
- Enhance the national institutional framework responsible of international waters,
- Integrate relevant international conventions and treaties governing the management and administration of international waters into national legislation and policy.

10. COMMUNICATION AND IMPLEMENTATION

10.1 Communication

To inform public who can effectively participate in sustainable water resources management:

- Launch national water campaign.
- Establish and maintain a continuous communication system in the water sector.

10.2 Implementation

- Elevation of water resources management as a key national priority.

- Sensitizing senior government officials and key stakeholders on the challenges and opportunities of WRM.
- Building of consensus on the implementation of the IWRM strategies.
- Soliciting support for the implementation of the WRM reforms.

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