INTEGRATED WATER RESOURCES MANAGEMENT ROAD MAP

Key IWRM Theme	Definition and Activities	Program Objectives	Responsibilities	Timing
1. Integrated River Basin Management	Activities to improve water access and services for users, including the environment, in river basins based on the principles of integrated water resources management. Required activities include: (i) Establishment of effective river basin management arrangements including financing arrangements; (ii) Preparation of State River Basin Inventory; (iii) Development and implementation of river basin plans in selected river basins including participation of stakeholders, updating of water resource inventory, inter-sectoral planning of water development and management; groundwater development and management plans; water quality and quantity planning and management systems to maintain river health; and plan financing; (iv) Preparation of pilot, community based, integrated Land and Water Management Plans in selected sub-basins and/or irrigation areas; (v) Operational management systems to implement basin water plans and where possible to include flow monitoring, volumetric measurement of abstractions, flow control and enforcement, and sharing of water; and (vi) Implementation of public awareness, information education and communication systems and campaigns on relevant water sector issues.	(i) Access for all people in the basin to adequate water supply and sanitation (ii) Water consumption is within the sustainable limits of water availability in river basins and sub-basins. Sources of water for domestic, irrigation, industrial, hydropower, aquaculture, leisure, and other uses are developed and managed consistent with water availability and sustainability (iii) River basin planning is transparent, integrative, consultative, effective, and uses information based systems including modelling and spatial data (iv) River basin planning and management integrates rain water, surface water, groundwater; water quantity, water quality; water and land use; and in-stream flow needs with all relevant sectors involved (v) Agreed policies, rules, and operational procedures including monitoring to implement river basin plans and water use by different sectors are implemented effectively	AC – IWRM WRD WRDO Directly involved stakeholders: CWC, WRA, TB, KNNL, other nigams, DMI, CADA, DA, DE, DF, DMG, WD, KUWSDB, WUCS; local government, civil society	August 2021

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2. Institutions and Policies for IWRM	"Institutions" is used in its broadest sense including organizations, legislation, policies and other protocols that define the relations among water sector organizations and their clients. Planning for IWRM (in this context, river basin planning) is seen as a mechanism for promulgating and implementing policies of government. Activities required include: (i) Organizational alignment for IWRM processes with interim arrangements initially for selected river basins (ii) Organizational capacity building for IWRM processes, including career development and reward systems (iii) Alignment and implementation of legislative framework (iv) Preparation of a State IWRM Strategy to and development of water resources policies aligned with economic, social and environmental objectives (v) Regulation (such as sustainable water utilization, wastewater discharge and water tariff approaches) (vi) Institutional development for participatory irrigation management (PIM) including formation and strengthening water user committees (vii) Capacity building of staff of agencies including IWRM Certification Program	(i) AC-IWRM recognized as an international standard think tank providing advice to SGOK (ii) Appropriate IWRM institutional frameworks within SGOK with clearly defined responsibilities and working partnerships with stakeholders in Karnataka leading to coordinated water resource management in the State (iii) National and international IWRM research and policy partnerships established with AC-IWRM providing access to state-of-art knowledge (iv) State IWRM Strategy in place and regularly updated and guiding strengthening of water sector governance (v) Policies, procedures and responsibilities suitable for Karnataka piloted and established to sustainably manage water resources (surface water, groundwater, quantity and quality) and involving major water users including the environment (vi) Decision makers, advisers, technical experts, and other key stakeholders effectively carry out their responsibilities with regard to water resources policy, planning and management (vii) Policy makers and other stakeholders knowledge and willingness raised to undertake necessary reform measures	AC-IWRM WRD CADA Directorate Directly involved stakeholders: CWC, WRA,	August 2021

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		(viii) Capacity of WRD and water related agency staff raised to ensure long term IWRM		
3. Data, Information, and Knowledge Management	Data, information and knowledge are fundamental to all aspects of decision making in water resource planning and management. IKM theme will include: (i) Preparation of a Strategy and Plan for Strengthening the Water Resources Information System; (ii) Data collection on surface and groundwater quantity and quality and collation of other natural resource data, such as land cover, ecosystems, etc., as well as such socioeconomic data such as population, poverty, and land use; for priority river basins; (iii) Hydrological monitoring in the K-8 and other priority river basins; (iv) Data archiving and management, including the collation of data from various sources, validation, computerization, and so on; (v) Data sharing and dissemination among government agencies, research establishments, and providing public access to data; (vi) Identification, development and implementation of appropriate decision-support tools, including geographic information systems, hydrologic and hydraulic models, and other analytical tools; and (vii) Research to increase knowledge in such fields as catchment processes, demography, etc., as well as new technologies for water conservation	(i) IWRM and river basin planning and policies are based on strong data and information sources and decision support systems (ii) A comprehensive State database on land and water resources in place and in a form that is accessible to all who need it to facilitate sustainable management of the State's water resources (iii) Agencies concerned with water management monitor and record water resources to agreed standards and according to their responsibilities (iv) Effective data-sharing arrangements in place among agencies and stakeholders in the basin and with central agencies including data sharing agreements (v) Research programs are providing highly relevant information to support IWRM	AC-IWRM WRDO KNNL, other nigams, Directly involved stakeholders: CWC, DPS, DITB; DeG; DMI, DA, DE, DF, DMG, WD, KUWSDB	August 2020

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	and environmental protection.			
4. IWRM Based Irrigation Management	Modernization of irrigation services, consistent with water management policies including infrastructure for irrigation water supply, integration with tank storages, command area works, water measurement and control systems, and improved operation and maintenance of the infrastructure developed in the process. It includes: (i) Participatory project planning, including irrigation modernisation planning (infrastructure and management development distinct from broader basin planning); matching cropping patterns to available water and increased income, water distribution plans, responsive to stakeholders; (ii) Modernising systems including canal lining, structure repair / replacement; incorporating tanks and off line storage, command area improvement including pipeline systems, drip irrigation, improved drainage systems to eliminate waterlogging; (iii) Automatic flow measurement and transmission of flow data for the main distribution system to monitor and enable volumetric measurement for each outlet to enable water control and bulk water charging for each WUCS; (iv) Operating and maintaining infrastructure including timely and volumetrically based water supply, asset management and full recovery of at least O&M costs; (v) Capacity building of both system operations staff and water user	(i) All water supply infrastructure capable of operating at design capacity (ii) Sustainable asset-management practices in place for all water-related infrastructure in the basin (iii) Institutions managing the infrastructure, volumetric supply of irrigation water to users and cost recovery of O&M at government, water authority and WUCS levels (iv) Reliable delivery of irrigation services within the constraints of available water resources (v) Commitment of involvement of water users in planning and management of irrigation systems	KNNL and other nigams CADA Directorate Directly involved stakeholders: DA, WUCS	August 2021

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	organisations; and (vi) Establishment of effective self-managed WUCS institutions for participatory irrigation management.			
5. Water Use Efficiency and Water Productivity	Increasing water use efficiency (WUE) and water use productivity (WUP) is a high government priority in order to save water that can be used for other purposes including use by industry, urban areas, and irrigation. However by focusing on single irrigation systems impacts at the larger basin level on downstream users and the environment are often overlooked. Also a focus on agricultural production does not necessarily translate into increased incomes to farmers. This theme will include: (i) Development of the concepts and understanding of water productivity, water use efficiency, crop and agricultural productivity and their practical application to IWRM (ii) Basin scale assessments of water use efficiency and water productivity including by remote sensing to identify the actual scope for making 'real' water savings as well as to support river basin planning and management. (iii) Improving WUE and Irrigation Systems by undertaking comprehensive assessments of irrigation systems using the FAO MASSCOTE tools, the assessments would also support Irrigation modernisation and Land and Water Management Plan activities	(i) River basin and water resources planning treats the water resource as finite (ii) Increased provision of water for irrigation or industry expansion is based on real water savings. (iii) Modernisation of irrigation systems is based on comprehensive assessments of system configuration and conditions (iv) The interests of farmers of increased profitability is recognised in irrigation and water resources planning	AC-IWRM KNNL and other nigams CADA Directorate Directly involved stakeholders: DA, DITB	February 2021
6. Stakeholder involvement and	Engagement of relevant stakeholders in planning and implementation, monitoring and evaluation of water resources	(i) Communities in selected basins are aware of and actively participate in the conservation,	AC-IWRM KNNL and other nigams	August 2021

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Capacity Building	management is a key "foundation" of IWRM. Stakeholders include the communities, businesses and government agencies active in the basins. Building the capacity of stakeholders for IWRM is important to sustainable water resources management. Stakeholder participation will include: (i) Education, awareness raising, and capacity building of communities and individuals on water management issues; and (ii) Community involvement in river basin planning and management, irrigation modernisation, and Land and Water Management Plan programs.	utilization, and protection of natural resources (ii) Communities are actively involved in deciding levels of services and water tariffs by water management utilities (iii) Local communities are actively participating in forums for planning and managing basin water resources (iv) Government commitment to stakeholder and community participation in river basin planning, water resources management and irrigation system management		

AC-IWRM = Advanced Centre of IWRM, CADA = Command Area Development Authorities, CWC = Central Water Commission, DA = Department of Agriculture, DE = Department of Ecology and Environment, DeG = Department of e-Governance, DF = Department of Fisheries, DITB = Department of Information Technology and Biotechnology, DMG = Department of Mines and Geology, DMI = Department of Minor Irrigation, DPS = Department of Planning and Statistics, KNNL = Karnataka Neeravari Nigam Limited, KUWSDB = Karnataka Urban Water Supply and Sewerage Board, TB = Tungabhadra Board, WD = Watershed Development Department, WRA = Water Resources Authority, WRD = Water Resources Department, WRDO = Water Resources Development Organization, WUCS = Water User Cooperative Societies.