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INTEGRATED RIVER BASIN APPROACH FOR DEVELOPMENT OF KOPILI RIVER BASIN

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ABSTRACT: The integrated approach river basin development was widely recognized for a decade of the world and with the multipurpose water development projects was strongly associated. This paper examines the processes of development in the Kopili River basin most important factors and circumstances that influenced of these processes and patterns of development. The paper then outlines the challenges to the Kopili River basin how important the integrated river basin approach. An integrated approach in this basin it is extremely important to create new attitudes between the basin states to promote cooperation and harmonization in the planning and development efforts, enhance the technological capabilities and institutional reforms. The integrated approach river basin development is a long process and must be based on site conditions and actual scenario.

***Keywords**:* Hydropower Development, water management, Irrigation development, flood risk management, flood warning, Capacity building

1. INTRODUCTION

The Integrated River Basin Development Plan (IRBDP) for the Kopili river basin is based on the concepts IWRM in which water resources development and management in the basin is not done on sectoral basis but in a coordinated way encompassing all major sectors. Several non-structural measures are recommended to be adopted in addition to the structural measures. Expand the meteorological network, upgrade some of the rain gauges to automatic real time reporting systems, and install real time water level monitoring stations at key locations along the river measure discharges at key locations along the river.

2. LITERATURE REVIEW :

Jordi Gallego-Ayala (2013) the integrated water resources management (IWRM) paradigm has emerged as the main guiding framework for water resources development and management. Since the IWRM approach started to gain prominence with the 1992 Rio de Janeiro Summit and the Dublin Conference, developing and developed countries worldwide have adopted and transposed the tools and principles embodied in this holistic approach into their national policies as well as their regulatory and institutional frameworks. The scientific community has performed extensive studies within the IWRM field. In fact, there is a growing literature analyzing multi-dimensional functions to pursue an IWRM approach in water resources management. The main objective of this study is to perform a literature review of the scientific knowledge in the IWRM field published between the years 2000 and 2011. A total of 353 papers published in scientific journals were carefully reviewed and extracted from the ISI Web of Science database. The main results show that: (a) the dominant research topics in IWRM analysis focus on its institutional framework, on equitable water allocation (sustainable management of water resources), and on IWRM implementation and stakeholder participation; and (b) the leading countries in scientific research into IWRM.

3. ABOUT STUDY AREA:

Kopili River near kala Nala is selected as the study area of this research project and surrounding area is where the experiment is performed the coordinates of the site are 25°39'57.39"N and 92°46'53.62"E .

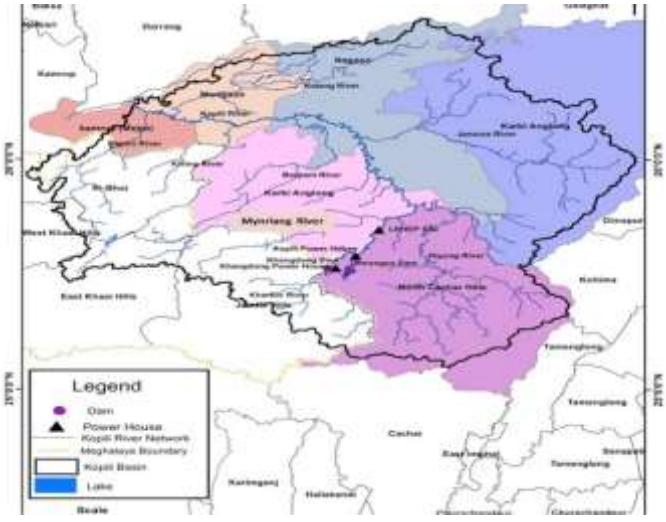

Figure No 1: The Kopili River basin showing Major tributaries

The description of kopili briefly elaborated mentioning about its infrastructure multiple purposes including hydropower, irrigation, drinking water supply, etc. So, since there is a hydro project is coming in lower kopili river, it is decided to choose Kopili River as the study area of this project.

4. SECTORAL INTEGRATION :

The major sectors of water resources development in the Kopili basin considered are:

a) Hydropower Development in the upper hill reaches, including small hydropower
b) Irrigation development in the middle and lower plain reaches
c) Flood and river bank erosion management in the lower plain reaches

Other sectors, which are related but not considered major from the water requirement point of view, are:

a) Domestic water supply
b) Fisheries
c) Navigation
d) Catchment area treatment

e) Improvement in water quality in the upper reach

5. PILLARS OF IWRM:

The non-structural measures deal with the three pillars of IWRM:

a) Appropriate 'management instruments' to assess, inform and manage water resources and mitigate floods and river bank erosion risks;

b) An effective 'enabling environment' of relevant policies and legislation to address these risks and management actions; and

c) An appropriate 'institutional framework' that embraces all stakeholders at the basin, state, local administration and community levels.

The non-structural measures included are:

a) Hydro-meteorological data monitoring and information dissemination

b) Provision of flood forecasting and warning

c) Integrated operation of the water resources systems (hydropower plants)

d) Land-use and hazard zoning, flood-proofing, emergency planning, community-based risk management planning, and education and financial measure.

5.1 INSTITUTIONAL INTEGRATION

To achieve a sustainable development of the water resources and to achieve an efficient water management system in the basin, it is essential that works of the various concerned agencies are coordinated in a meaningful way. Two models are suggested in this regard:

a) A coordination mechanism in which all concerned agencies share information on water resources and management. Assam Water Resources Management Institute (AWRMI supported by Assam Water Mission can be the apex agency to develop and implement. such a coordinating mechanism among various stakeholders such as WRD, ASEB, NEEPCO and Irrigation Department.

b) A formal institutional mechanism, which might lead to the formation of a River Basin Organization (RBO) in the future, to enable water resources development and management in the basin in an unified way. Since this is a complex and sensitive issue, it is proposed to conduct a stakeholder workshop for discussing the concept of a RBO for Kopili Basin.

5.2 SECTORAL STRENGTHENING WITH IWRM PILLARS :

Present sectoral development planning and of the water resources in the Kopili basin will benefit by strengthening its approach using the three pillars of IWRM Figure below.

Figure No 2: Sectoral Development Strengthened

The process of the Sectors Development are:

Sector 1- Hydropower, Integration with other to unified operation of hydropower systems considering downstream flood impacts in the Kopili basin, possibility of providing irrigation and domestic water from small hydropower plants, Coordination among APGCL, NEEPCO, WRD Assam.

Sector 2- Flood Management, Integration with other Protection of agricultural land/ irrigation areas, designing adequate drainage, maintaining natural fish habitats, restoring connections between rivers and beels for fish migration, Coordination among WRD, BB, Irrigation Department.

Sector 3- Irrigation, Planning low lifts pumps for irrigation flood protected areas. Developing hydropower from irrigation canals, Coordination among WRD, Irrigation Department.

Sector 4- Domestic water supply, , Integration with other providing water supply from small hydropower plants and ground water, Coordination among Ground water board

Sector 5- Fisheries, Integration with other maintaining natural fish habitats, restoring connections between river and beels for fish migration, coordination among Department of Fisheries.

Sector 6- Water Quality Improvement, Integration with other implementing water quality restoration plan with treatment of the low Ph in the upper reaches of Kopili river and its tributaries, coordination among Pollution control Boards, Department of Geology and Mines, Relevant Agencies.

Sector 7- Navigation, Integration with other providing required navigational depths coordination among BB, WRD, PWD.

Sector 8- Land use control, Integration with other providing flood Zonation, design flood levels, coordination among Inland water transport, WRD.

5.3 HYDRO- METEOROLOGICAL MONITORING

Manage the hydropower systems in close coordination with flood management systems, it required to:

a) expand the meteorological network upgrade some of the rain gauges to automatic real time reporting systems

b) install real time water level monitoring stations at key locations along the river

c) Measure discharges at key locations along the river.

The density of rain gauges in the upper catchment of the Kopili basin is found to be adequate. However, the middle and lower parts of the basin need more rain gauges to compute rainfall representative of the respective areas. A suggested expansion and upgrading in rain gauge network. A total of 7 automatic rain gauges reporting in real time are recommended to be installed. A real time rain gauge consists of a tipping bucket type of rain gauge, a data logger, a transmission system based on GPRS and solar power back up.

Monitoring of water level is required along the river in addition to the existing water level gauges of CWC at Dharmatul, Kampur and Kheronighat. New automatic water level recorders are suggested to be installed at eight locations given below.

a) The suggested water level gauge locations are: upstream of Khandong dam (to monitor water level of the reservoir),
b) upstream of Umrong dam (to monitor water level of the reservoir),
c) upstream of LKHP dam (to monitor water level of the reservoir),
d) downstream of Kopili-Dyung confluence,
e) upstream of the proposed Borpani middle HEP reservoir, and
f) Downstream of Jamuna-Kopili confluence.
g) upstream of Umium reservoir
h) upstream of proposed Killing dam site

It will also provide an opportunity to include sensors for some water quality parameters such as pH and DO, along with the water level sensors. In order to convert the water levels into river flows, it is suggested to measure discharge at two gauge locations.

The real time data collected from the proposed stations will be assimilated in a database is a web based SCADA system, which will be available for all the authorized stakeholders. Assam Water Resources Management Institute (AWRMI) is the mandated agency to manage such a system. AWRMI is in the process of implementing real time data acquisition system (RTDAS) under the World Bank Hydrology Programmed (2017-2021).

5.4 DISSEMINATION OF FLOOD WARNING :

The success of a flood forecasting system can be ensured only when flood warnings reach to flood affected communities and are effectively used by them reducing flood risks. Also the flood forecasts and warnings should be used meaningfully by revenue departments at various levels from state to districts and down to block and Panchayat levels. Disaster management agencies should be able to get access to the flood warning in time and in easily understandable forms. Similarly, flood warning should reach to NGOs and civil societies.

5.5 COMMUNITY BASED FLOOD RISK MANAGEMENT:

For a community, flood risk management includes diverse yet related activities and actions. Some of the key actions are dissemination and use of flood information and warning, dealing with emergencies during floods, recovery after floods and preservation of livelihoods. For people, it is always a crucial decision to decide to leave their houses and go to safer places because of the considerable effort and hardship involved. Hence many villagers try to endure the floods as long as possible. They move to other places only when it is no longer possible to stay in their own homes. People do not leave their home in normal floods since they can survive in stilt houses or on in-house raised platforms or granaries on stilts inside the house and can travel for essentials on boats or rafts. It is only in major floods when the floors of the stilt houses or raised platforms are submerged or the house itself is seriously damaged that they leave for the nearest safe shelter. People who are poor do not have boats or strongly built houses and leave early for safe places. Some people prefer to stay on raised platforms (made of bamboo) outside the house. Those who cannot

make raised platforms, or do not like to stay on them, come out to the road and stay in makeshift houses. Usually people have to leave their homes when the flood is caused by embankment failure or when there is a flash flood originating from an extraordinary cloudburst or landslide. Embankment failures are largely anticipated because they happen over a few days and people are informed through the local network, as mentioned earlier. Hence people get time to plan their evacuation.

5.7 INSTITUTIONAL CAPACITY BUILDING:

Capacity building activities are of two types: Technical and Management, including coordination. In the technical part, agencies involved need their capacity strengthening in database development, hydrological modeling, and optimization of reservoir operation. In the management part, the agencies need to establish and implement an effective coordination mechanism in the unified operation of the reservoirs.

6. CONCLUSION

Integrated River Basin Development Plan (IRBDP) for the Kopili river basin is based on the concepts IWRM. Hydropower Development in the upper hilly reaches, including small hydropower, Irrigation development in the middle and lower plain reaches, Flood and river bank erosion management in the lower plain reaches and Institutional capacity building coordination with Technical and Management.

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