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Pragyambu

cGanga
Centre for Ganga River Basin Management and Studies

The purpose of this quarterly digest brought out by the Centre for Ganga River Basin Management and Studies (cGanga) led by the Indian Institute of Technology Kanpur is to disseminate valuable traditional and scientific knowledge assimilated from national and international sources on various aspects of management of water and river restoration and conservation among concerned institutions and citizens.

River Conservation and Development: Importance of Boundaries

In the first issue of the *Pragyambu* Digest, an attempted was made to understand river basin management, river restoration and conservation, and the priority and role of stakeholders. Thus it was explained, in order to carry out river basin management and river conservation, it is necessary to have complete river-related information about the basin. For this purpose it is needed to know about various components and constituents, on the basis of which negotiations and decisions can be made at the competent level. To start this cycle of river basin management discussed in the inaugural issue of *Pragyambu*, it is necessary to first define the basin boundary.

Natural and Administrative Boundaries of River Basins and Water Resources

To understand different natural processes occurring in the river and its basin area, and to assess and counter adverse natural and manmade impacts in the basin, the basin may be divided into many small areas for administrative ease and convenience of carrying out conservation and development activities. These small, artificial sub-divisions may be termed administrative boundaries. Note that a river may run across several administrative boundaries, or many rivers may lie within one administrative boundary. As an example, along with the natural boundary of the Ganga River Basin and several administrative boundaries, an attempt has been made in the adjoining picture to show more than one river or tributary within an administrative boundary (**Figure 1**).

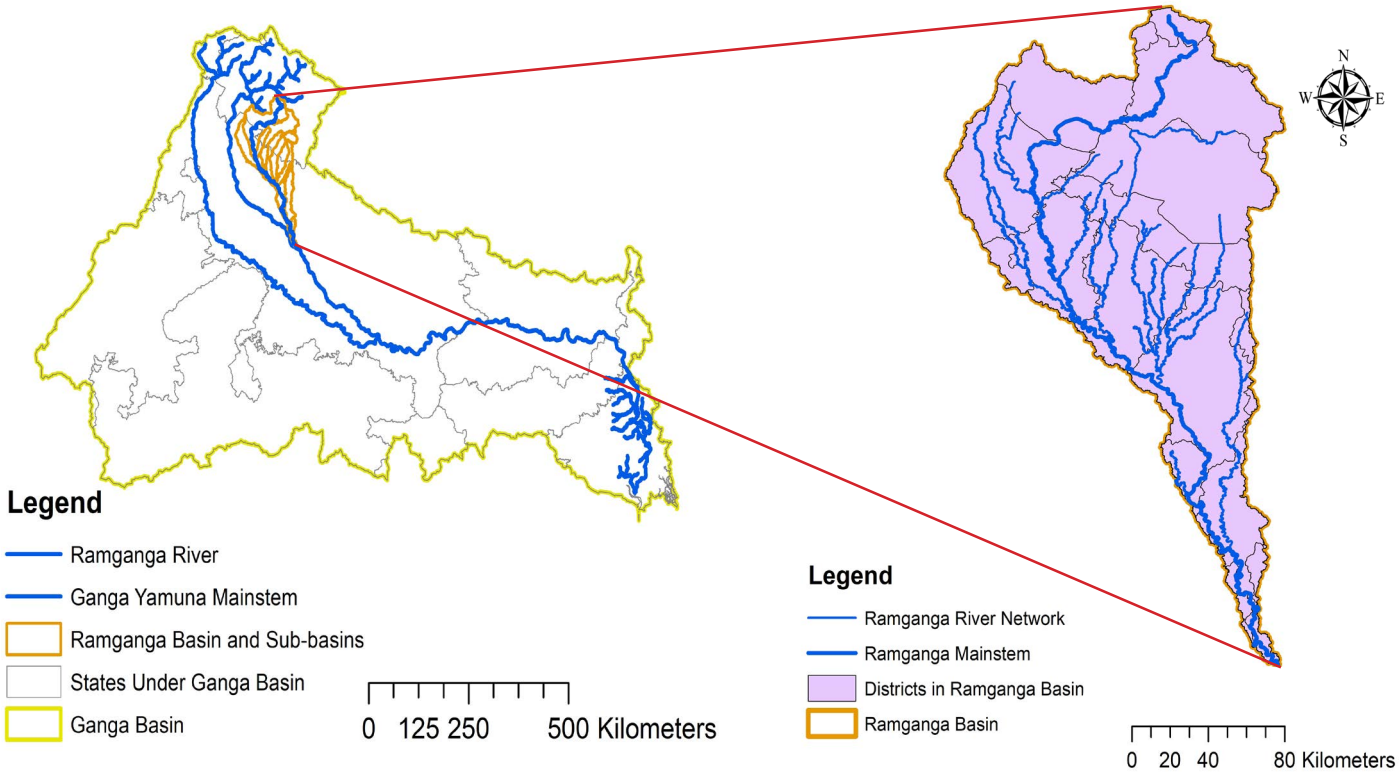


Figure 1: Identification of natural and administrative boundaries of rivers

Present Status of Data and Information related to Rivers and Water Resources

The first successful attempt to formulate the basin management plan in India for a big river like the Ganga was made by the IIT Consortium. The IIT Consortium discussed, compiled and presented many special reports on vital issues for the Indian government and other stakeholders. At the time of GRBMP preparation India needed a plan for the conservation of River Ganga at the earliest. A top-down approach was adopted in GRBMP, which was also necessary at that time for complete knowledge of the major issues in the Ganga basin. In this effort, through discussions on various issues, it was realized that there is a need to change the approach and adopt a bottom-up approach to resolve various issues. Thus, while each approach has its own usefulness, the appropriate one should be selected as per the requirement. Keeping in view administrative convenience and effectiveness, it was felt that proper management and conservation can only be done by administratively dividing into higher order (large), middle order (tributaries) and lower order (rivulets). For this, it is necessary that plans should be made at local levels also, in which the participation of local stakeholders should play an important role. The main problem encountered in this effort is the lack of proper and detailed information. At present, information related to rivers and water resources and the factors affecting them are not available at one single place. This lacuna not only obstructs the work of evidence-based analysis and identification of problems in concerned subjects, but also creates problems in the formulation and execution of future plans. Therefore, it is necessary that different types of information should be collected and kept ready for use as far as possible by removing errors in them. cGanga is trying to carry this work forward. In the **Figure 2**, an attempt has been made to show the different types of information needed for planning the conservation of rivers at local levels, although the quantum and type of information required depends on local conditions.

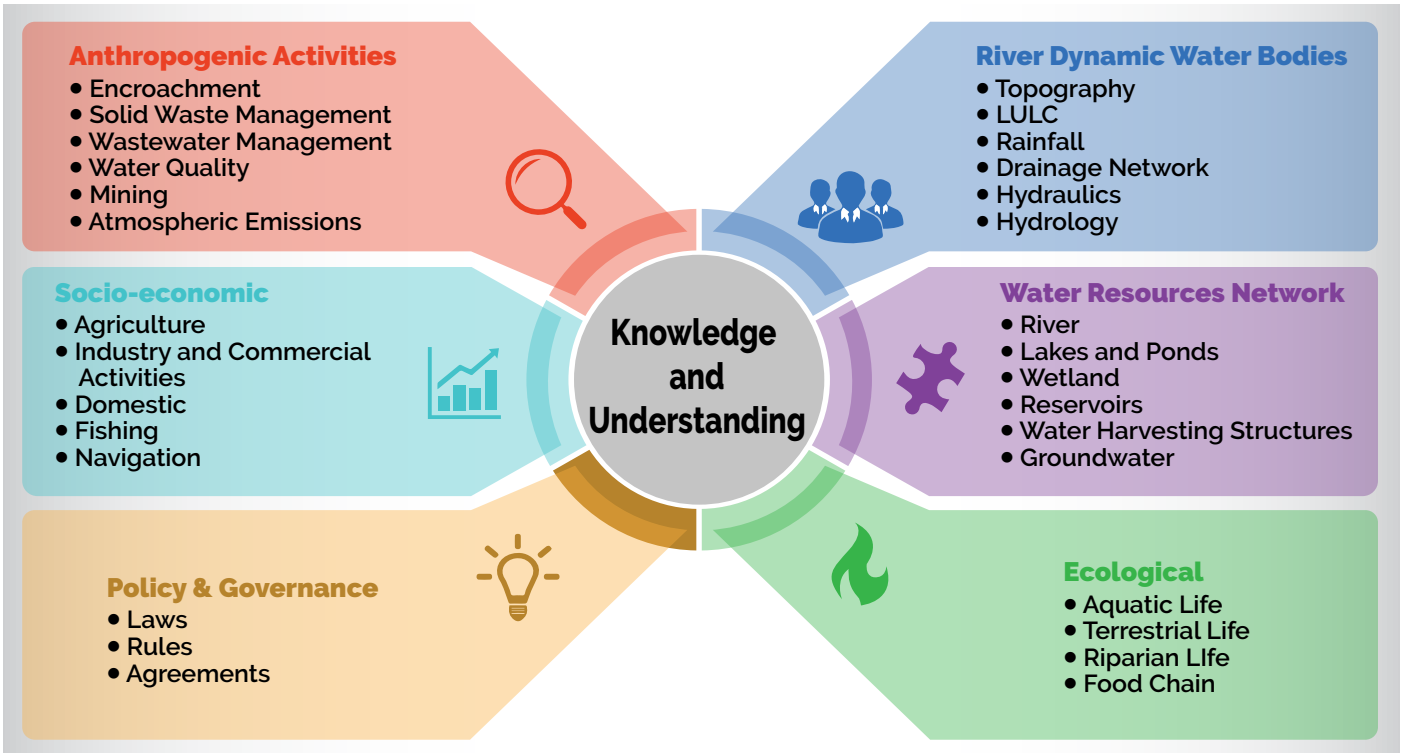


Figure 2: Various type of information/data needed for conservation and development of local water bodies

Knowing Your Water Sources: Why is it Important?

As shown in the **Figure 3**, almost all the different types of water resources in an area are interconnected in some way or the other. Such connections may be for only a part of the year or for the whole year. As discussed earlier in this digest, conservation and development of rivers and waterbodies and their maximum, sustainable use should be planned at the local level. For this, it is necessary to determine the water budget within the geographical boundaries of an administratively defined area, in which the availability of water through various means and the maximum appropriate use of that water on

Figure 3: Typical representation of various type of waterbodies and their connections in any defined geographic boundary

priority basis can be determined. This has been discussed in detail in a recent document published by cGanga on the Arth Ganga framework. Now, it is impossible to manage things that are not known and not understood. Hence the first requirement is to collect information about the water-holding capacities of all waterbodies, their current use, water quality, etc.

Water Use and Availability, Actual Water Demand!

Hydrological cycle is a natural process which can be affected to some extent by artificial factors. As discussed earlier, only after detailed estimation and study of the incoming and outgoing water in any area, the availability and use of water needed for various purposes in a given area can be correctly determined. **Figure 4** shows the different types of water inflows and outflows in a given geographical area.

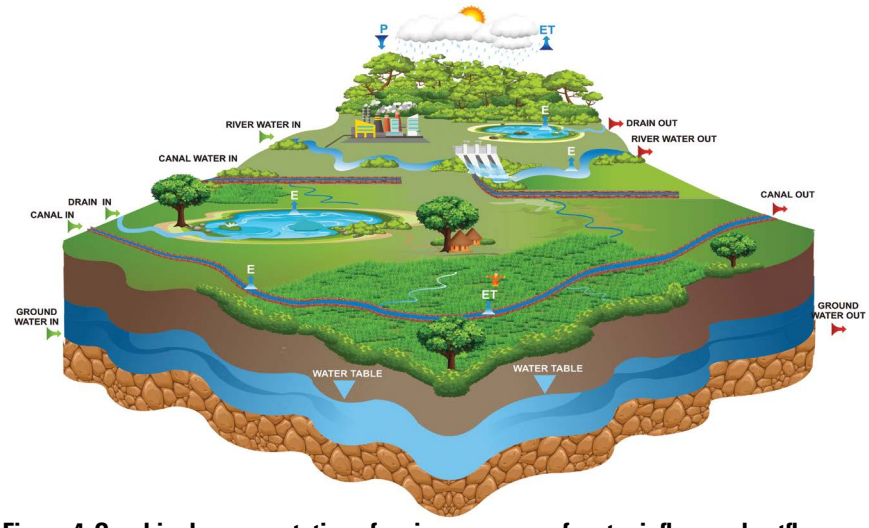


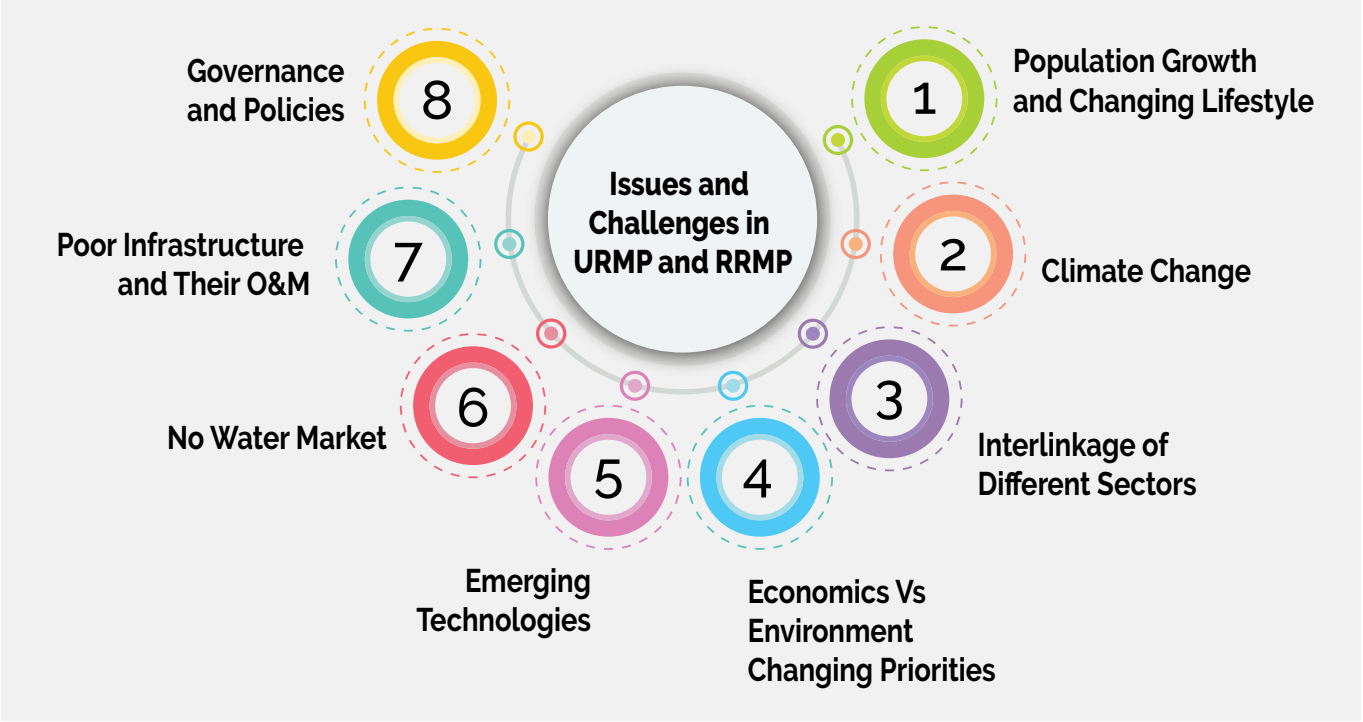
Figure 4: Graphical representation of various sources of water inflow and outflow in a defined geographical boundary

Water scarcity in any area is presently defined in terms of per capita water availability estimated on the basis of the area's population, industries, etc., and the status of its water sources. But, while doing so, are various re-uses of the used water after treatment included in the computations? Should water availability be a criterion to set up industries in an area? Should the amount of water used on a daily basis be considered the actual demand for water, or should the water that goes out of the local water cycle be considered the actual demand? There are many such questions, logical answers to which being very important for sustainable use of water and water sources. Any region, state or country should be considered to have water excess or scarcity only after considering all these issues.

River Management Within Natural and Administrative Boundaries

As discussed earlier in this digest, collecting complete information about its natural and administrative boundaries and the water resources within those boundaries is important for managing any river basin and the conservation and management of the river. There may be both rural and urban human settlements in the natural flow areas of rivers, so plans should be prepared for such areas on the basis of the use of rivers, changes in the natural forms of rivers, etc.

- Restoration of all natural drains which carry water during the rainy season and remain dry at other times or have wastewater flows in them.
- Storm water drains and wastewater drains should be separate because, in case of mixing, the quality of rain water not only deteriorates, but the total quantity of wastewater and the cost of its treatment also increases.
- Treated wastewater should be stored in natural drains and ponds/ waterbodies which can be reused to meet shortfalls in water supply. Water trading/markets will also develop with the availability of reusable water at relatively low prices.
- Natural drains and ponds/ waterbodies will need to be interconnected, which will endow waterbodies with water for long periods and will also help in groundwater recharge and flood water management.



Availability of Water Sources and Water Harvesting/ Farming for 'Ghar Ghar Nal – Har Ghar Jal'

The government is making efforts to provide basic facilities like water to be supplied to every household in India. There are many areas in the country where even today there is no local source of water, and one has to travel far to fetch water for one's needs. Water will be supplied to such places from other areas through the Har Ghar Jal Yojana. For this work about Rs 3.5 lakh crore has been earmarked in the budget, and infrastructure will be developed for the work. This plan is very important, but have we ensured the long-term availability of water sources to continue the work of early delivery through this plan? It is logical to have mercy on the official structure for execution of such long-distance water supply works, but water is of course needed by people. In such a situation, can we do some water management work at the local level, or can any solution be found by combining these two, so that water supply can continue into the future and, simultaneously, the plan is not only for building infrastructure. It is necessary that, along with local administrations, subject experts also brainstorm on this question and choose the right path. Water harvesting/farming, as suggested by cGanga, can be a far-sighted option in this choice since creating huge infrastructure for long-distance transport of water can be avoided thereby. At such places, local people themselves may be entrusted with rainwater harvesting and supply of the same, apart from landowners of water harvesting lands. Farmers owning water-logged lands and lands that are unusable for most of the year can benefit economically and through employment from such local water development activities.

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