

Water Resource Management; A Case Study Of Banka District, Bihar

Dr. Priyanka Kumari* & Ravi Shankar**

* Senior Research Scholar, University Department of Geography, T.M. Bhagalpur University, Bhagalpur.

** Research Scholar, University Department of Geography, T.M. Bhagalpur University, Bhagalpur.

Introduction

Management of water resources means making the best use of available water resource for human benefit. It involves preventing and controlling pollution as well as depletion of water in view of present and future needs. Flood, drought, inefficient use, pollution and contamination by pathogens are common problems related to water. Water wastage must be prevented not only in industrial, irrigation or municipal processes but also in everyday of life.

Water is a basic human right. It is not only considered essential for human health. It is also desperately needed by poor women and men in rural area for productive reasons to grow food for the family or generate income. Almost 90 percent of water resources are used for agriculture and industries. Water can empower people through a participatory process of water management. Water provides a useful example of environmental resources which require careful management, because it occurs in limited quantities yet demand for water of specified qualities has been rising throughout the present century. As natural resource water has many uses and values, including water supply, maintenance of hydrological balance, use in food production. An important element of fresh water lands include rivers, lakes reservoirs, canals, ponds and marshy areas.

Study Area

the Banka district is located between 24⁰30'00" to 25⁰09'00" North latitudes and 84⁰30'00" to 87⁰12'00" East longitudes. The proposed study relates to a small geographical unit a newly carved district out of old Bhagalpur. The district is situated on the south eastern portion of South Bihar Plain. Due to mixed topographic terrain – both plateau and plain, it has a distinct personality of its own. It is very close to Jharkhand, bounded in the south and east by Deoghar, Dumka and Godda district, whereas, its northern boundary touches Bhagalpur district and western portion is adjacent to Jamui and Munger districts.

Methodology

The methods used in the research work are descriptive as well as analytical. Data have been collected from sample survey also; systematized and cartographic interpretation has been made. The work aims to make an empirical attempt to discuss the theme threadbare, in a systematic manner to draw conclusions and findings based on both primary and secondary sources of data and information.

Data of the different types of water resources like Under Ground water, Rivers, Ponds, Canals & irrigational uses of water resources has been collected with the help of Irrigation Department, Agriculture Department & 11 Block offices of the Banka district.

Land-use erosion of lands and forest cover data has been collected with the help of Block Development officers, Soil Conservation officers and Forest Department of the respective areas.

Review of Literature

Water Resource Management

Water is one of the fundamental premises for life on the earth across life forms like human beings, livestock, birds and all beings that breathe need fresh water. Water is supposed to be the ‘liquid gold’ in the present day context. Today water is fast becoming a resource like valuable oil. Water is a basic component for human habitat and biosphere. Nearly 71 percent of earth’s surface is covered with water in the form of ocean, seas, rivers, dams and lakes etc. As a natural resource water has many uses and values including water supply, maintenance of hydrological balance, use in food production. It is an important element of scenic diversity and fresh water lands include rivers, lakes, reservoirs, canals, ponds and other marshy areas.

Irrigation

Irrigation is essential to increase agricultural production. Agricultural productivity depends on the controlled supply of water to crops. If irrigation is available in any area productivity depends on the controlled supply of water to crops. If irrigation is available in any area productivity may be increased by the use of fertilizers and pesticides. There is 63.30% of N.S.A irrigated in the district. Dhoraiya anchal has maximum irrigated area (89.5%) while Katoria has lowest irrigated area (29.33%).

Shambhuganj, Barahat, Dhoraiya, Amarapur, Phulli Dumar, Belhar and Rajoun have more irrigated area than district average while five anchals—Banka, Baunsi, Katoria and Chanan have less irrigated area than district’s average. It is clear that all hilly anchals have less irrigated facility. Rivers have shallow basins in northern anchals. There are many canals in these anchals. This is why northern anchals have more area under irrigation.

The district has 36.7% of NSA unirrigated which lies mostly in Katoria, Chanan, Banka, Baunsi and Barahat anchals. In other anchals the area living far

from river basins are unirrigated.

Many types of means of irrigation are being applied in the district. The major means of irrigation include government canals (38.50%), well (10.25%) and electrified wells (1.93%), tube well (3.20%), electrified tube wells (1.85%), Pucca canal (3.60%), rivers (13.49%), tanks (5.87%), lake (34%) and other means (20.97%) which is shown in table No. 1.

Table – 1

Source – wise Irrigated Area (2015 – 16)

Source	Number	Purely Irrigated Area	Irrigated Area having more than one crops
1. Canal	6	45228.40	36183
2. Tank (Govt.)	401	3951.60	2500
3. Tank (Pvt.)	--	--	--
4. Open well	3018	4249.00	5000
5. Tube well	6225	6225.00	6225
6. Other sources	--	3418.00	49908
7. Ponds	--	3951.00	--

Source: Irrigation Deptt., Banka

About 82.79% of land is irrigated by surface water while the ground water is used only 17.21% mainly in summer season.

Agriculture depends mainly on the availability of water at proper time and in proper quantity. In this region, the main source of water is rainfall. However, on account of failure of monsoon at times of premature season of rainfall, the need for irrigation is felt. Before the zamindari abolition, the zamindars used to maintain Ahar and Pynes which served the twin purposes of irrigation and drainage. Besides these channels, these are wells for irrigational purposes.

After independence, the government has under different five years plans

drawn up and executed various schemes of irrigation. Important major schemes are the following in the district of Banka.

- (i) Chandan – Belsari Scheme.
- (ii) Chandan Reservoir Scheme.
 - (a) Kaja – Danr Irrigation Scheme Phase – I
 - (b) Kaja-Danr Irrigation Scheme Phase – II
 - (c) Main Chandan Reservoir Project Phase – I
- (iii) Badua Reservoir (Hanumana Dam)

Irrigation Practices

The various major surface water irrigation schemes present in Banka district are as follow

- Chandan Reservoir Irrigation Scheme.
- Kojhi Dam Irrigation Scheme - Phulidumar blocks.
- Badua Reservoir Project – Shambhuganj and Belhar blocks.
- Chandan – Bilasi Irrigation Scheme, Banka.
- Orhni Reservoir Irrigation Project – Banka and Phulidumar blocks.
- Lakshampur Reservoir Irrigation Project – Baunsi blocks.

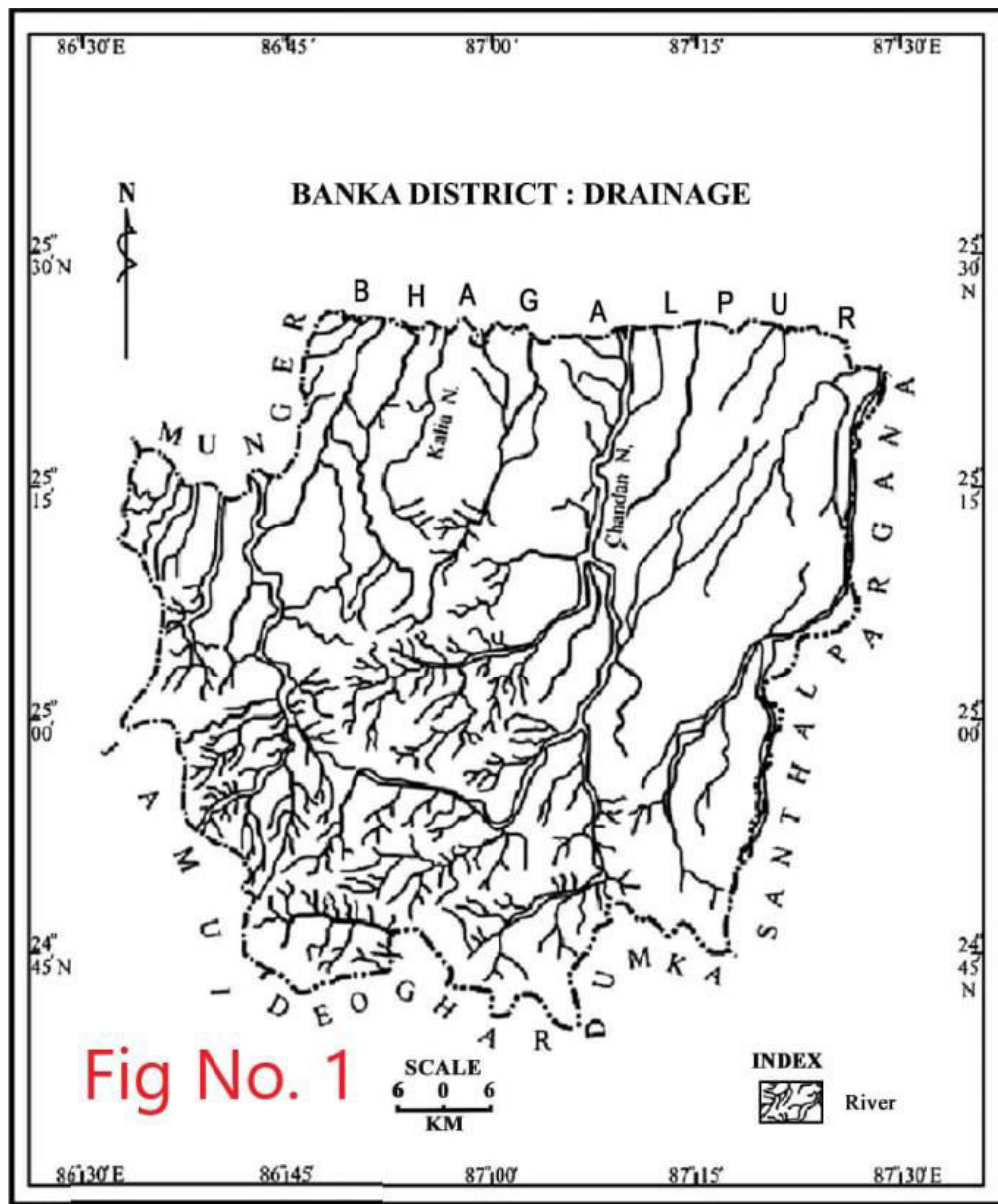
The Chandan reservoir is a major irrigation project of Banka district. Its command area falls in Banka, Barahat, Rajoun and Dhoraiya anchals of Banka district. The gross command area is 140 m ha. and the surface water irrigation facility is available only to 0.64 m ha. in kharif and 7690 ha during rabi crop (this is inclusive of water directed from structures like ahar etc.) The area irrigated by different sources e.g. canals, tube wells, dug wells and other sources constitute 66 percent of the total cultivated area in the district. Canal is the most important source of irrigation in Banka district.

Drainage and River System

The flow of water according to the gravity of slope on a particular land is known as drainage. The streams of the area follow the general slope of the land which is from south to north. The drainage of the district is the part of river Ganga. The southern and south-western parts of the region are hilly. Many hill streams originate in this area and meet the river Ganga after a northward traverse.

The courses of rivers and streams of the districts run in the south and south-east and meet the river Ganga near Champa Nala the western portion of the Smart City Bhagalpur and in eastern portion it meets near Ghogha the western portion of Kahalgaon town. The actual collecting rain-water is performed mostly by small water courses or ahar which connect the main drainage artery, e.g. the Ganga. The tract to the south of the Ganga is drained by the south-north flowing Chandan river and its tributaries to which the whole gamut of minor streams or small water courses enter. These are able to drain of the excess rain water into the Ganga during the active monsoon period.

The area is drained out by hilly temporary streams. Many hill streams originate from this area among which Badua, Chandan, Belsari, Kadwa, Gerua, Sukhania, Gobra, Chir, Orhni, etc. are important. These rivers have achieved their base level. There are many meanders in the flowing path of the rivers which indicate its old stage. Finally, all the rivers join the river Ganga which



serve their base level. Some of the important rivers of the district are as follows:
(Fig. No.1)

1. **Badua** : This stream originates in the hills of Chakai from nearby district Jamui and flows north east through Belhar anchal. Further, it joins with one of the branches of Chandan river and finally meets into the river Ganga.
2. **Chandan** : It is the largest river of the district. It rises from Dehania and Trikut Parbat lying north of Deoghar district of Jharkhand state. Its catchment area spreads over about 1340 sq. kms. The river passes through the outskirts of Banka town. At the place where this river enters the town, it has a broad and important torrent, but as soon as it approaches the flat lands, most of its flow is lost in the 'Tal' lands. From Jethornath the river passes south for 9 kilometres through a fine level country and then splits into two branches near Birma (Amarpur anchal), in which one is known as Puraini branch and other is known as Andhri branch. Finally this river merges into the river Ganga near Champanagar of Bhagalpur city.
3. **Chir** : It originates from Rampur Pahar and flows along the eastern border of the district upto a distance of 60 kilometres. Further in plain area it is divided into two branches namely Kalti and Gerua. Both streams join the river Ganga near Ghogha and Kahalgaon in Bhagalpur district respectively.
4. **Orhni** : It is a short hill stream which flows mainly in Banka anchal and joins the river Chandan near Banka town.

Banka district is drained by a network of hill streams. These streams flow south to north. It proves that the slope of the rivers is from south to north. The tract to the south of Ganga is drained by the south-north flowing Chandan river and its tributaries to which the whole gamut of minor streams.

Ground Water Resource

Groundwater is a valuable resource and an important environmental asset for humans. Groundwater plays an important role in rural and agriculture areas around the region as well as around the world. It is the main source for food production. Groundwater is the major source for irrigation throughout the world and almost half of the drinking water is obtained from groundwater. Out of the total available water sources in India, 38.5 percent is groundwater. Out of which, 55 percent is used for irrigation in which 85 percent for rural areas and 15 percent in urban areas. The main source of drinking water of Banka district is groundwater. Above 95 percent households of the district use groundwater for drinking such as hand pump (65.85%), uncovered wells (25.45%), covered wells (1.29%), tapewater (3.75%) is also got from tube wells bore hole. Only 3 percent households use drink water from spring, river/canal, tank/pond/lake and other sources.

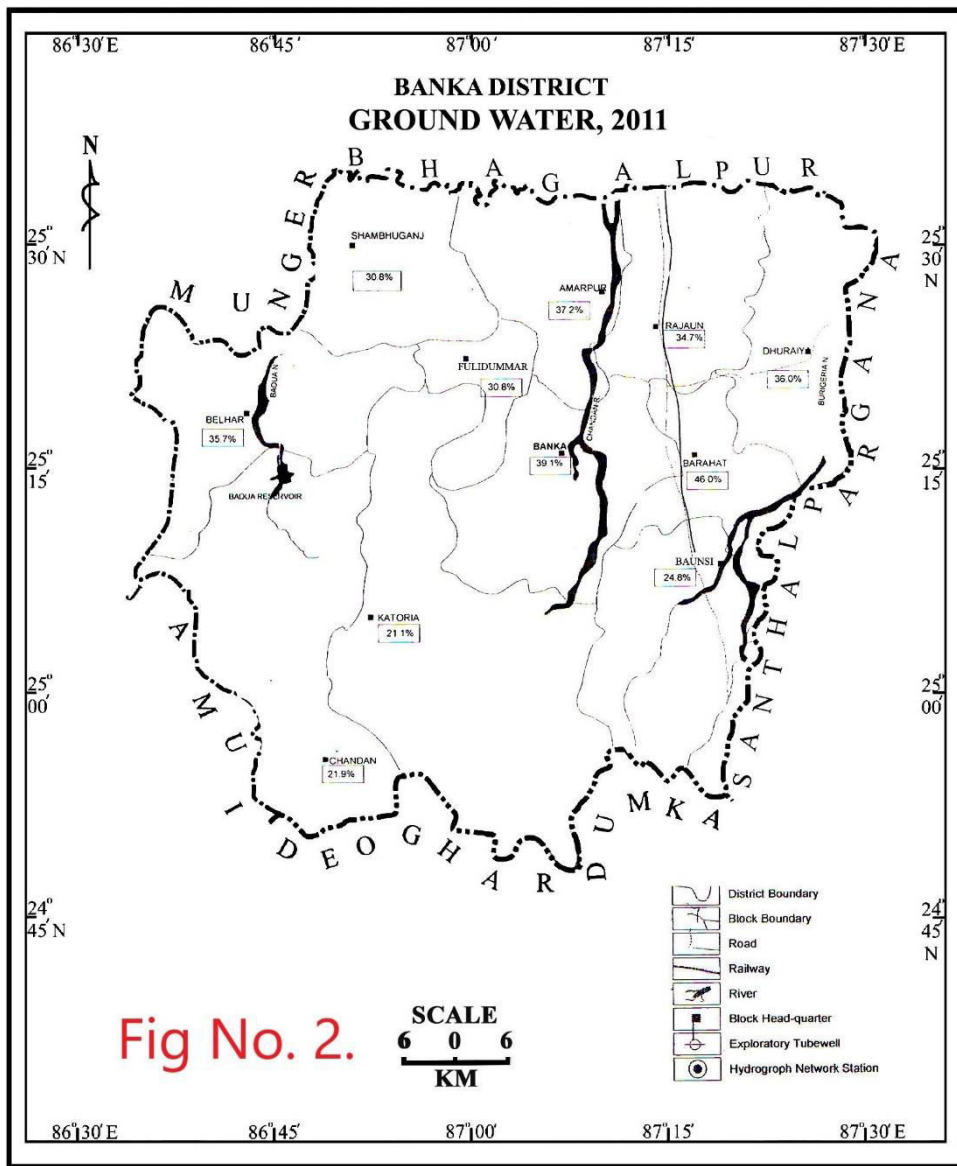
Ground water is a valuable resource and an important environmental asset necessary for human activities. Depth to ground water level of pre – monsoon period (**Fig No. 2**) indicates that it is shallowest (0– 4 m) in the north-western part of the district covering Shambhuganj, western parts of Amarpur and northern part of Belhar blocks. The depth of water level in the range of 4–5 m covers the rest of Amarpur block, southern part of Shambhuganj and northern part of Phullidumar block. The subsequent 5–7 m water level occupies the major part of the district covering Belhar, North Chandan, North Katoria, almost entirely Banka, Rajoun, Dhoraiya and northern part of Baunsi blocks. The deepest water level range of 7–9 m occupies the southern hard rock area of the district, covering southern part of Chandan, Katoria and Baunsi blocks.

During the post-monsoon period the depth of ground water level is the north – western and north – eastern parts of the district. Rest in the range of 0–3

m bgl, followed by 3–5 m range of water level covering the central part of the district. The southern part of Chandan and western part of the Katoria block show the deepest water level of 5–7 m.

Ground water related Issue and Problems

The alluvial plain of the district is by and large free from any major flood



or water logging problems. But due to excessive load of sediments in the streams during the peak monsoon, flash flood occurs in the district. Most affected blocks are Banka, Rajaun and Amarpur. The district is

suffering from low ground water development. The overall stage of ground water development in the district is 32.7 percent which is very low and the contribution of ground water towards irrigation is minimal.

Mass awareness and training activity is needed in the district. Till now no mass awareness and training activity have been carried out in the district. All blocks of Banka district are under safe category for ground water development point of view. So far no block has been notified by either Central Ground Water Board or State Ground Water Authorities.

Integrated Watershed Management

The management of a single unit of degraded land from the perspective of all its water related issues is called watershed management. It involves soil and water management. Watershed management aims to conserve the soil and recharge water supplies. It ensures the availability of sufficient clean water improving health and growth of the area.

Watershed management consists of the following steps :

- i) Identify a degraded area of land.
- ii) Demonstrate the need to improve the quality of clean water to the local community and thus ensure their participation.
- iii) Take up afforestation by planting grasses and plants of the study area which will hold the soil and prevent soil erosion.
- iv) Construct a series of long trenches and mounds in the district to hold the rain water and allow it to percolate into the ground.
- v) Make nala plugs and check dams in the streams so that the water does not rush down the hill side of Chanan, Katoria, Baunsi and Belhar anchals so that it can help in holding back larger amounts of water.

This will improve the water table and keep the rivers flowing throughout the year. Thus watershed management can be used to manage a river from its source to its valley which receives several small streams of the district. Thus afforestation of degraded areas and recharging ground water are the two main principles of watershed management. There is a growing recognition throughout the world of the urgent need for Integrated Water Resource Management for the effective and efficient management of water resources. According to the Technical

advisory Committee of Global Water Partnership promotes the coordinated development and management of water. The National Policy 2012 was adopted by National Water Resource Council. Since the constitutional competence to frame laws relating to water lies with the State legislatures. The policy aims to providing a nationally acceptable framework which can be adopted by the States of Bihar also.

Summary & Conclusions

In spite of availability of ample water in Banka district, there is always a scarcity of drinking fresh water. There is not good management of water resources. There was a time when water flowing from rivers was considered safe for consumption, but it is not so now. The rivers have now become dirty, polluted and toxic because of discharge of industrial wastes, sewage, garbage and washing of cloths. People living in the areas and villages along the banks of river Chandan still use the water from the river. They always remain at the risk of suffering from various diseases. 50 percent households in the Banka district have no drainage for wastage water, about 40 percent households have open drainage for wastage water out. Hence, its management is essential for good health of the people of the region. It is also vital for maintaining healthy eco – systems for the people.

The main goal of Water Resource Management is to optimize the available natural water flows, surface water and ground water to satisfy the human needs. In Chandan – Badua command area conjunctive use of surface and ground water may be practiced in Shambhuganj block. The augmentation of canals by ground water resource can be done and a portion of surface water should be diverted to adjacent areas where ground is scarce.

Artificial recharge on the hilly and piedmontal landscape area should be

taken up by consideration. The post monsoon ground water level can be observed from the post monsoon water table and map. The southern area of Chandan and Katoria blocks are suitable for artificial recharge. Flooding in the district can be minimized by constructing a series of check dams and gully head plugs.

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