Government D. B. Girls P. G. Autonomous College, Raipur (C.G.)

Department of Economics

REPORT

EDUCATIONAL VISIT TO NISDA BARRAGE- AARANG

SEPTEMBER 16 , 2017

ACKNOWLEDEGMENT

We would like to thanks “Dr Preeti Sharma” for giving us permission for Educational visit. Without her support it would not be possible to conduct this educational visit. We would like to thanks Mr. Bachaani who gave us permission to visit and understanding the importance, working & components of Barrage. We would like to thanks to the persons who served us with food.

We would like to express our special gratitude and thanks to the persons for giving us such attention and time.

Overview of the Educational Visit

Government D B Girls (Autonomous) P.G College had organized an educational tour of one day on 16 September 2017 to Nisda Barrage located near Aarang 48km from Raipur, Chhattisgarh for students of Economics Department .This educational tour was the part of curriculum. This tour was organized with prior permission of Dr Preeti Sharma .Dr Preeti Kansara, Dr Anita Dikshit & Miss Divya Jain were the co-ordinator for this whole educational tour. Total 23 Students visited to site.

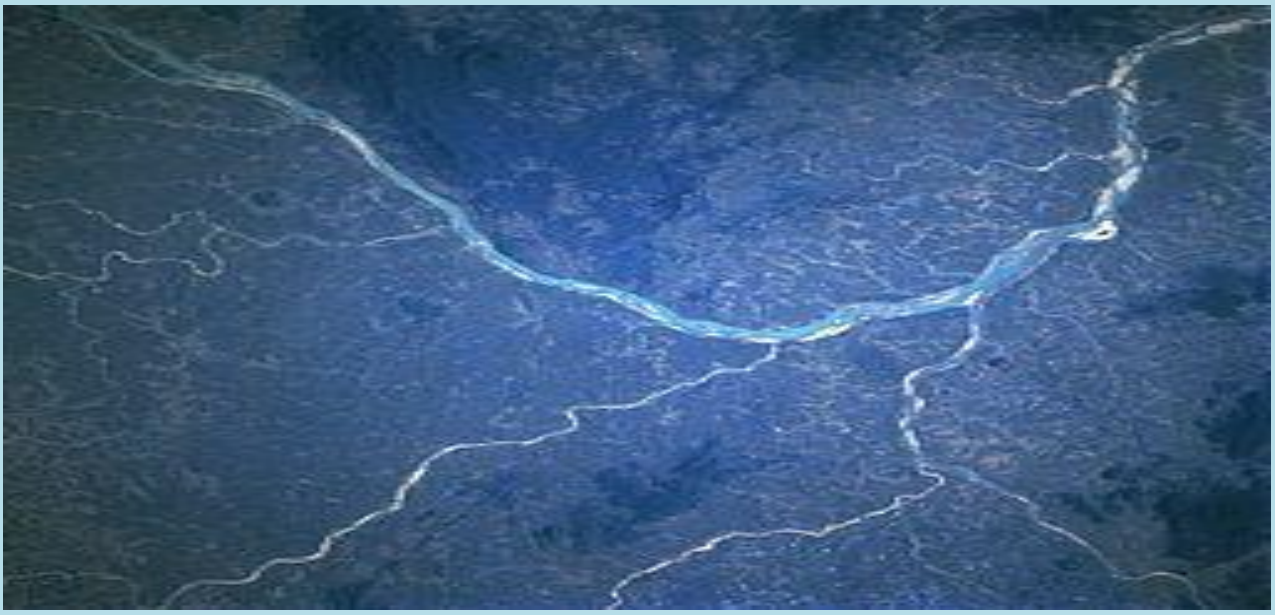
Objective

- To understand the working of barrage
- For cost benefit analysis of barrage..
- To find the importance of barrage for environment, agriculture, industries, irrigation facilities.
- To find the contribution of barrages in economic growth of the region

Detail of Journey

We started our journey at 10:30 am by a bus. It took around 1.5 hour to reach the destination. After reaching there we met with Mr…….. . After taking rest for half an hour the working of barrage gate is explained by Dr Anita Dixit which is built on the river Mahanadi. River Mahanadi is know as “Lifeline of Chhatisgarh”. Mahanadi is the largest river in Orrisa and Chhattisgarh region. In the ancient age the river Mahanadi was know with name “Chitrotpala”.

Others names of river Mahanadi are “Mahananda” and “ Nilotpala”. Mahanadi has origin from the Mountain Chain of Sihawa situated at Dhamtari.



Satellite view of River

Miss Divya Jain explained the basic difference between dam & barrage and about major barrages in Chhattisgarh state. **Dr Preeti Kansara** (Head of Department of Economics) explained the contribution of barrage in economic development & growth. She explained the importance of barrage for controlling flood. Its contribution in increasing agricultural productivity. Its importance for industries. She gave the very important information about greenhouse vegetable farming. We visited to see green house vegetable farming. Their Barbati/Lubiyawere grown.

Then we had a lunch over their at around 2:30pm. At 3:45 pm we again visited to barrage. Dr Anita Dikshit explained the students about the construction, components, and cost benefit analysis of Nisda Barrage. Details of these are given in the report. At 5:45 tea and snacks were served which were liked by all. At 6:20 pm we boarded the bus and came back to college 7:30pm.

NISDA BARRAGE

Let me start preparing this Educational Visit Report by explaining the difference between Dam and the Barrage. Miss Divya Jain explained this difference to students. Both the words seem to be similar and are used interchangeably many times, but there is a quite difference between the two. First, let's check out what's the similarity between the two. Both are constructed across the river to maintain the flow of river, for diverting water to canal for irrigation& for generating electricity. So it becomes often confusing to distinguish between both.

Apart from similarities these two have following differences

- In Barrage, the entire length across a river that is between the banks is provided with gates having their bottom level touching the river bed level. Therefore the water storage behind Barrage is totally dependent on *Height of its gates.*
- In Dam, there are spillway gates near its top level and the storage of water behind the dam is mainly due to the height of the concrete structure and *partially* due to the height of the gate.

Barrage is considered as a type of Dam. According to *World Commission on Dams*

"A barrage is built for diverting water, a dam is built for storing water in a reservoir to raise thelevel of water considerably and barrage is usually built where the surface is flat across meandering rivers. It raises the water level only by a few feet."

- A dam stores surplus flood water and distributes it through irrigation tunnels in the dam or through canals from its reservoir.
- In the case of barrages, there is no such storage and the canals take water directly from the rivers.

Thus it can be said that whereas dams add water, barrages subtract it.

List of Barrage in India with River

1. Barrages in Jharkhand

- Bokaro barrage on Bokaroriver.

2. Barrages in West Bengal

- Durgapur Barrage on River Damodar
- Farakka Barrage on River Ganges
- Tilpara barrage on River Mayurakshi
- Jaldhaka Barrage on Jaldhaka river
- Tista Barrage on Tista river

3. Barrages in Odisha (formerly Orissa)

- Naraj barrage on river Mahanadi
- Jobra barrage on river Mahanadi

4. Barrages in Andhra Pradesh

- Prakasham Barrage on river Krishna
- Dowleswaram Barrage on river Godavari

5. Barrage in Uttrakhand

- Asan Barrage built across at the confluence of River Asan and Eastern Yamuna Canal near Dakpathar.
- Dakpathar Barrage is built across river Yamuna.
- Bhimgoda Barrage is built across the River Ganges at HarkiPauri in Haridwar district of Uttarakhand.

6. Barrage in Haryana

- Hathnikund Barrage is the replacement of Tajewala Barrage across the River Yamuna in Yamuna Nagar district of Haryana.

7. Barrage in Punjab

- Talwara Barrage is built across the Beas River.

8. Barrage in Rajasthan

- Kota Barrage is build across the River Chambal at Kota City in Rajasthan

9. Barrage in Chhattishgarh

- Mongra Barrage is built across the river Shivnath.
- Rajiv Samoda Barrage is built across the river Mahanadi.
- New Rudri Barrage is built across the river Mahanadi.
- Nisda Barrage is built across the river Mahanadi.

Components of barrage

Main barrage portion:

a. Main body of the barrage, normal RCC slab which supports the steel gate. In the X-Section it consists of :
b. Upstream concrete floor, to lengthen the path of seepage and to project the middle portion where the pier, gates and bridge are located.
c. A crest at the required height above the floor on which the gates rest in their closed position.
d. Upstream glacis of suitable slope and shape. This joins the crest to the downstream floor level. The hydraulic jump forms on the glacis since it is more stable than on the horizontal floor, this reduces length of concrete work on downstream side.
e. Downstream floor is built of concrete and is constructed so as to contain the hydraulic jump. Thus it takes care of turbulence which would otherwise cause erosion. It is also provided with friction blocks of suitable shape and at a distance determined through the hydraulic model experiment in order to increase friction and destroy the residual kinetic energy.

Divide Wall

- A wall constructed at right angle to the axis of the weir separating the weir proper from the under sluices (to keep heavy turbulence at

the nose of the wall, well away from upstream protection of the sluices)

- It extends upstream beyond the beginning of canal HR. Downstream it extends up to the end of loose protection of under sluices launching apron)
- This is to cover the hydraulic jump and the resulting turbulence.

The fish ladder:

- For movement of fish (negotiate the artificial barrier in either direction)
- Difference of level on the upstream and downstream sides on the weir is split up into water steps by means of baffle walls constructed across the inclined chute of fish ladder.
- Velocity in chute must not be more than 3m/s
- Grooved gate at upstream and downstream - for effective control.
- Optimum velocity 6-8 ft/s

Sheet piles:

Made of mild steel, each portion being 1/2' to 2' in width and 1/2" thick and of the required length, having groove to link with other sheet piles.

Upstream piles:

Situated at the upstream end of the upstream concrete floor driven into the soil beyond the maximum possible scour that may occur.

Functions:

1. Protect barrage structure from scour
2. Reduce uplift pressure on barrage
3. To hold the sand compacted and densified between two sheet piles in order to increase the bearing capacity when barrage floor is designed as raft.

Intermediate sheet piles:

- Situated at the end of upstream and downstream glacis. Protection to the main structure of barrage (pier carrying the gates, road bridge and the service bridge) in the event of the upstream and downstream sheet piles collapsing due to advancing scour or undermining. They also help lengthen the seepage path and reduce uplift pressure.
- Downstream sheet piles: Placed at the end of downstream concrete floor. Their main funtion is to check the exit gradient. Their depth should be greater than the possible scour.

Inverted filter:

- Provided between the downstream sheet piles and the flexible protection. Typically 6" sand, 9" coarse sand and 9" gravel. Filter may vary with size of particles forming the river bed. It is protected by placing over it concrete blocks of sufficient weight and size. Slits are left between the blocks to allow the water to escape.
- Length should be 2 x downstream depth of sheet.

Functions:

- Check the escape of fine soil particles in the seepage water.

Flexible apron:

- Placed downstream of the filter
- Consists of boulder large enough not to be washed away by the highest likely velocity
- The protection provided is enough as to cover the slope of scour of 1 1/2 x depth of scour as the upstream side of 2 x depth of scour on the downstream side at the slope of 3.

The under sluices: scouring sluices

Maintaining a deep channel in front of the Head regulator on the downstream side.

Functions:

1. As the bed of under sluice is not lower level than rest of the weir, most of the day, whether flow unit will flow toward this pocket => easy diversion to channel through Head regulator
2. Control sil entry into channel
3. Scour the silt (silt excavated and removed)
4. High velocity currents due to high differential head.
5. Pass the low floods without dropping
6. The shutter of the main weir, the raising of which entails good deal of labor and time.
7. Capacity of under sluices:
8. For sufficient scouring capacity, its discharging capacity should be at least double the canal discharge.
9. Should be able to pass the dry weather flow and low flood, without dropping the weir shutter.
10. Capable of discharging 10 to 15% of high flood discharge

Guide banks:

11. Earthen embankments => stone pitching

Force the river into restricted channel, to ensure almost axial flow near the weir site. (embankments in continuation of G-Banks. To contain flood within flood plains)

Marginal Bunds:

Provided on the upstream in order to protect the area from submergence due to rise in HFL, caused by afflux.

Groans or spurs:

- Embankment type structures constructed transverse to river flood, extending from the banks into the river (also transverse dykes)
- Protect the bank from which they are extended by deflecting the current away from the bank

Findings:-

1. The social and environmental benefits of barrage are more than its monetary cost.
2. As Chhattisgarh is an agriculture-based state know as “Bowl of Rice”. Its major source of income is from agriculture. Apart from natural source of water i.e rain irrigation facility is provided from canal water diverted by barrage help in better productivity.
3. Better agricultural productivity contribute major portion in GDP of the region.
4. To some limit it helps in controlling flood.
5. It provides water supply to various industries situated nearby which provide remarkable contribution in the GDP of the State.