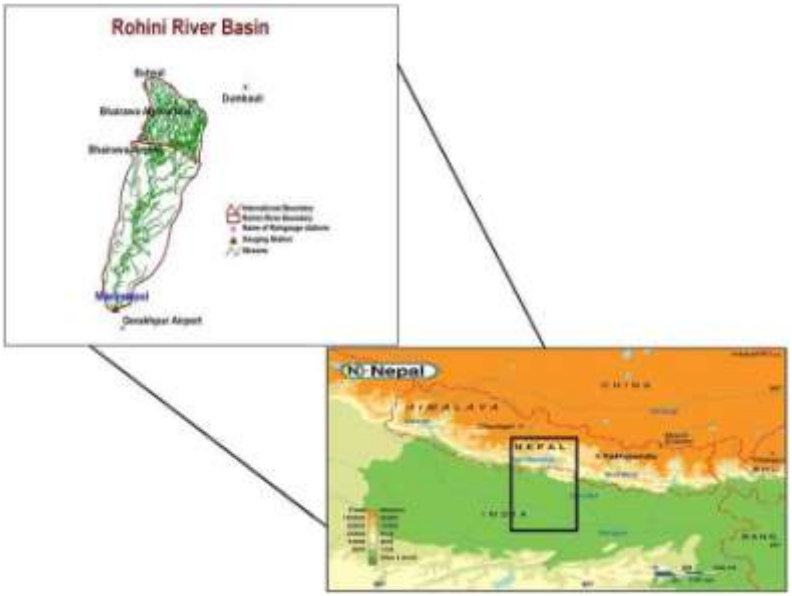
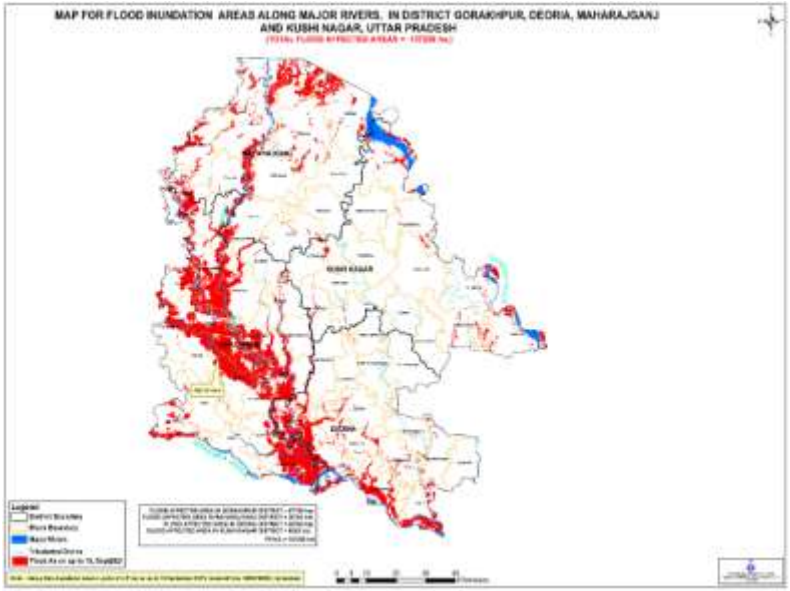
Flood Vulnerability and Coping Capacity : Vetiver Plantation

Trans Saryu Region





Rohini Basin Dynamics

- ✓ Many hill streams and drainage system in the Rohini Basin.
- ✓ Swell with water during monsoon.
- ✓ Rivers and drains bring soil and silt from Nepal.
- ✓ Poorly formed banks subject to overflow and erosion.
- ✓ Frequent change in the course of river.
- ✓ The basin also contains vast expanse of temporary swamps and local water bodies.
- ✓ Historically these water bodies played important role in flood management and provided livelihood.
- ✓ Over long period these water bodies encroached upon.

Vulnerability Profile of Region

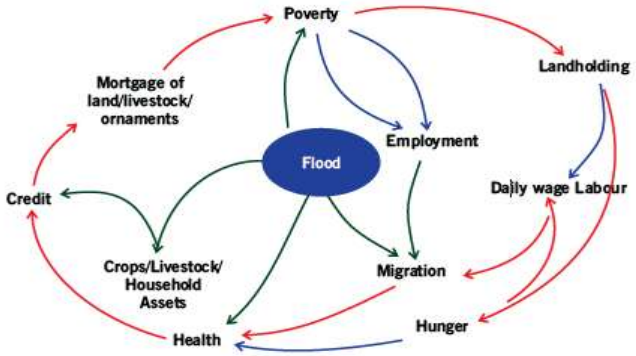
- History, Trends & Impacts
  - ✓Rohini and Rapti basin prone to frequent flooding.
  - ✓Rohini Basin elevation 107m in NE to 76m SE.
  - ✓One third of Rohini catchment in Nepal.
  - ✓Cloudbursts and intense rainfall.
  - ✓Major floods ⟹ 1954, 1961, 1974, 1993.
  - ✓Frequency and intensity on rise ⟹ 1998, 2001, 2007.
  - ✓Gradual slope ⟹ large scale and long term flooding.
  - ✓Flooding more pronounced when drainage channels merge with Rohini.

Overall Nature of Flooding

- Inundation depths increased.
- Unpredictability of floods ⟹ essentially due to breaching of embankments.
- Confluence of drainage system and rivers more vulnerable.
- Constant and prolonged water logging in certain areas.
- Unplanned development, encroachment of flood plains and climate change.
- Floods from traditional friend of mankind turned foe.

Impact on Socio Economics

- ✓ High Population density 1000 per/sq. km. against the national average of 250 per/sq. km.
- ✓ BPL- Maharajganj 30.8%
  - Gorakhpur 28.2%
- ✓ Incidence of poverty higher in SC/ST, extremely poor, low literacy and socially disempowered.
- ✓ Impact not only restricted to damage due to floods but extends to wide ranging issues of livelihood, migration leaving women behind, health and also psychological well being.
- ✓ Impact on women-severe. Workload higher post disaster, social adaptability low, physical coping capability low.



Livelihoods analysis: poverty viz-a-viz floods

Embankment Management

- ✓ Construction of embankments-Traditional approach since 1970.
- ✓ Embankments reduce regular flooding, but increased the possibility of more severe flooding due to breaching.
- ✓ Frequent breaching –Causing more damage.
- ✓ Embankments ⟹ rise in riverbed ⟹ decreases the water carrying capacity ⟹ greater chances of flooding.
- ✓ Drainage congestion due to roads, railways, canals etc..
- ✓ Lack of maintenance.
- ✓ Siphon clogging.
- ✓ Failure of Hydraulic designs.
- ✓ Faulty Planning – Water logging area in Maharajganj increased by 65 to 95 of 1971-1991 period.

Earlier floods used to bring more goods than harm.
Now floods cause immense damage and bring widespread devastation

Gaighat Floods 1998

- ✓ Gaighat located on the bank of Rapti, between Rapti and Bathuanala.
- ✓ Regular flooding since 1952.
- ✓ Due to constant change in river course, migration to safer places and dwellings in agricultural land.
- ✓ Continuous embankment construction since 1952 till 1985.
- ✓ In 1980s, embankment constructed and many houses in the shadow of embankment.
- ✓ In 1998 embankment breached and the region experienced worst floods in the history.
- ✓ Large scale damage and water logging remained for long period.

One of the possible ways to control river erosion is by Vetiver Plantation

So What is Vetiver Grass ?

- ✓ For centuries commercially cultivated for scented oil.
- ✓ Found in more than 70 nations.
- ✓ However, its utility to control soil erosion not widely known.
- ✓ Notwithstanding, its use for erosion control prior to 1st WW in British Caribbean particularly for sugarcane fields.
- ✓ Vetiver is so persistent that it can survive for decades and even centuries.

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So What is Vetiver Grass ?

- ✓ An aromatic plant.
- ✓ Grows abundantly in Rajasthan and many other states in India.
- ✓ Multiple use of plant.
  - Oil from roots in perfume industry.
  - Khas curtain used in summers to keep rooms cool.
  - Agricultural land improvement.
  - River water purifier.
  - River erosion.
  - Slope stability.

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So What is Vetiver Grass ?

- ✓ Bio-engineering tools for preventing erosion and slope stabilization-sustainable bio-engineering technique.
- ✓ Roots are very sturdy which increases the shear strength of soil, thereby enhances slope stability appreciably.
- ✓ Highly tolerant to adverse growing conditions such as extreme soil pH, temperatures and heavy metal toxicities.
- ✓ Successfully implemented in Australia, China, Thailand, Philippines and other many countries countries.
- ✓ In India, the present study of Bongaigaon, Assam.

Morphological Characteristics

- ✓ Extremely deep root system, capable of reaching down to two to three metres in the first year itself.
- ✓ Extensive and thick root system binds the soil.
- ✓ When planted close together, reduces the flow velocity, diverting runoff water and forming a very effective filter.

Physiological Characteristics

- ✓ Tolerance to extreme climatic variation.
- ✓ Extreme temperature from -14˚C to 55˚C.
- ✓ Ability to regrow very quickly.
- ✓ High level of tolerance.
- ✓ Highly tolerant to toxic levels.

Ecological Characteristics

- ✓ Intolerant to shading will reduce its growth.

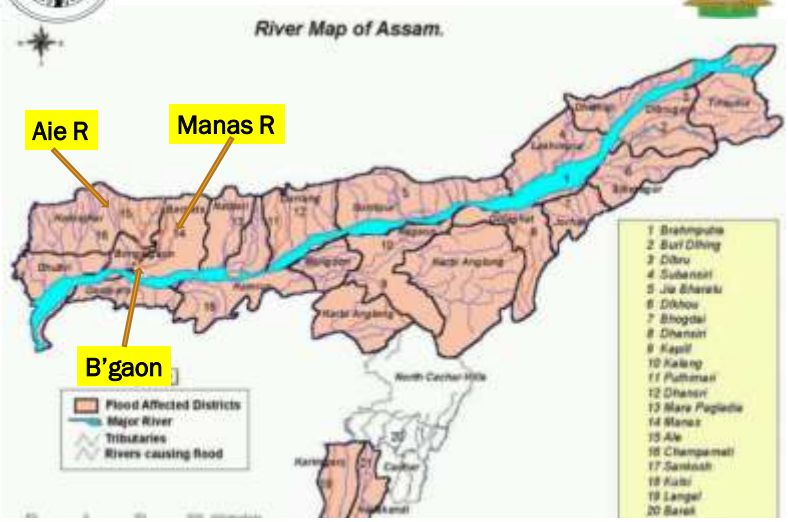
Vetiver Grass

Vetiver for Slope Stabilization

China slope protection project

Flood Profile: Assam

- ✓ Abundance of rivers has posed severe challenges for the state in the form of natural disasters.
- ✓ Flood prone area of India is about 10.2%, whereas Assam is 39.58% which is four times of National mark.
- ✓ Problem is further aggravated by river erosion on the banks.
- ✓ 4.27 lakh Ha eroded by rivers since 1950.
- ✓ Average annual rate of erosion is 8000 Ha.

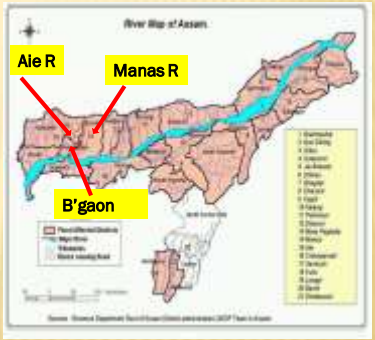


Dynamics of the Region

- ✓ Bongaigaon district has an area of 1725.29 sq.km.with a total population of 738804.
- ✓ Floods usually occur from June to Oct.
- ✓ Caused by the bursting of river banks due to heavy and high intensity of rainfall during the monsoon season.
- ✓ Heavy rainfall in the foothills of Bhutan lead to a surge in the water level.
- ✓ Breaching of embankments, over utillisation of wetlands, poor drainage system and unplanned settlements in the flood plains.
- ✓ Plains and char areas and over the embankment also aggravate the situation many a times.

Dynamics of the Region

- ✓ Aie R originates at the foothills of Bhutan and travels 51 km within Bhutan and thereafter 98 km in Assam before merges with Brahmaputra.
- ✓ Aie R joins Manas at Santoshpur, Bongaigaon.
- ✓ Caused by the bursting of river banks due to heavy and high intensity of rainfall during the monsoon season.
- ✓ In the year 2020, floods occurred mainly due to diversion of oblique channel of river.



Aie R in Spate

Bongaigaon Initiative

- ✓ To protect houses and communities from being flooded, zila Parishad Bongaigaon constructed an agricultural Bundh.
- ✓ However, the meandering course of the River posed a constant Threat.
- ✓ To keep the Agri-Bundh standing during of Major floods, a scheme of Vetiver plantation in the bundhs was devised and implemented.
- ✓ Done through the convergence of MGNREGA and Water resources department.

Details of the Project

Name of GP	Sanctioned length (in meters)	Amount	Completed	Vetiver plants Planted
1. Bhandara	3650 m	88.63 lakhs	3650 m	2,30,000
2. Goraimari	4240 m	130.02 lakhs	4240 m	2,47,000
Total	7890 m	218.65 lakhs	7890 m	4,77,000

Impact Assessment

Year 2020

Sl. No.	Item	Expenditure Amount	Remarks
1.	House Damaged	1,84,24,500/-	
2.	Agri Damaged	4,85,28,383/-	
3.	Infrastructure Damage	2,23,00,000/-	
		Rs 8,92,52,883/-	

Year 2021

Sl. No.	Item	Expenditure Amount	Remarks
1.	House Damaged	0.00	
2.	Agri Damaged	0.00	
3.	Infrastructure Damage	0.00	
		0.00	

Impact assessment

- ✓ Result was in the backdrop of heavier rainfall of 1956mm in year 2021 against 1267mm in year 2020.
- ✓ No erosion of agricultural bund post vetiver plantation.
- ✓ Location was extremely vulnerable, 56000 people lived in 16 villages.
- ✓ Done through the convergence of MGNREGA-social inclusivity.

Challenges in Execution

- ✓ Convincing community-locals never seen such technology.
- ✓ Apprehension that such technology can really work.
- ✓ First time inclusion in the Gram Panchayat action plan.
- ✓ Good quality Vetiver Grass.

Thank You