



# Living with or beside the river : Control of Brahmaputra's hydrological dynamics v/s peasant mobility

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**Living with or beside the river :**  
**Control of Brahmaputra's hydrological dynamics v/s peasant mobility**

## Introduction

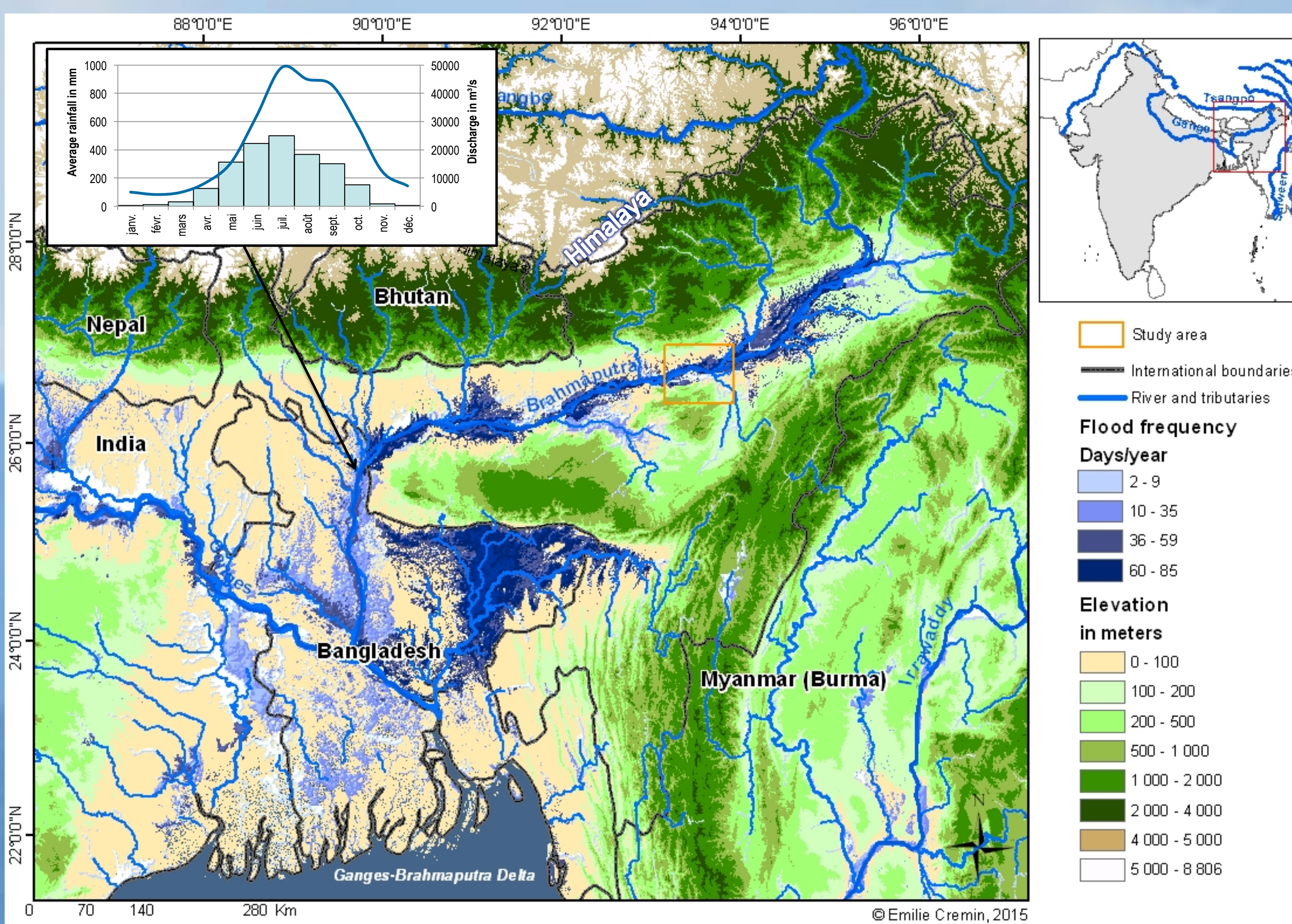
In North-East India, every year during the monsoon season, the level of the Brahmaputra rises and floods cover the plain with silt and sandy sediments (fig.1). The Brahmaputra undergoes extreme changes with regards to its channel configurations, involving the erosion of cultivated and village land. To prevent these phenomena, the territorial authorities have built embankments along the riverbanks in order to improve land use and to protect human settlements.

Nevertheless, peasant communities have been used to cope with floods for a long time.

They have adapted their farming practices to diked areas and are no longer prepared to face flood related to breaches in the levees. They cultivate different types of paddy and grow varieties that can adjust to the various ecosystems. They also used to moving their settlements according to how the river channels shift.

## Material and method

- Field survey in Bokakhat, Dhakuakhana and Majuli subdivisions (date)
- Different categories of stakeholders (peasants, elected officials, local governments and NGOs)
- GIS project using topographical maps, Landsat and SPOT images (1970 to 2011)
- Breaches in embankments and related damaged areas (GPS land survey, verified on Google-earth).



Map of flood frequency in the topographical context of northeastern India. Sources : SRTM 90 mtrs, Hydro Watersheds (USGS, WWF), UNEP/GRID-Europe Unisdr, Global Risk Data Platform, 2011. By E.C. 2015.

Chart of average precipitations & discharge in the Yamuna at Bahadurabad hydrological station near Dhaka (Bangladesh) from 1969 à 1992. Sources : Data collected from Flood Control Department, Govt. of Assam (<http://www.envisassam.nic.in/riversystem.asp>).

## Hydrological dynamics

- 80% of the annual rainfall (2500 mm/year) throughout the monsoon season
- Water discharge directly correlated to the rainfall.
- Annual floods are beneficial to the plain ecosystems:
  - bring water to wetlands
  - promote fish cycles of feeding and breeding
  - increase soil fertility through silt deposit
- Beyond certain thresholds of duration and water level, floods can damage farms, crops and housing.
- These thresholds depend on the micro-topography and existing river control facilities.
- The landscape of the Brahmaputra consists in a mosaic of environments shaped by interactions between hydrological dynamics and human activities.

## BRAHMAPUTRA and TRIBUTARIES RIVERS MORPHOLOGIES



### A. Brahmaputra's river shapes

- ① Channels "Noi"
- ② Islands "Saporis"
- ③ Erosion and accretion areas "Kohonia"
- ④ Terraces  
River banks and unflooded areas
- ⑤ River banks & Dikes "Mataori"

- |   |   |                |
|---|---|----------------|
| A | B | Main river bed |
| C | D | Flood plain    |

### B. Tributarie's river shapes

- ⑥ Main channels "Nodi"
- ⑦ Abandoned channel "Mori suti"
- ⑧ Wetland "beel"
- ⑨ Temporary lakes with croissant shape "Dubi" ou "Hola"
- ⑩ Flood plain

- E F Profil

## Conclusion

- Debate around river embankment is still crucial in Assam. Despite regular breaches local authorities still consider embankments as a way to control the river and protect farmland and villages. Nevertheless, they are constructed as part of a dualistic approach of the relationship between the river and its inhabitants.
- **Controlling the river through embankments generate risks instead of protecting people. There is a mismatch, between river management and the hydro-geomorphological dynamics, leading to the increased risk of embankment failures and the occurrence of so-called "natural hazards"**. Indeed, the risk exposure is resulting from **changes in the interactions between human activities and hydrological processes**. The concept of risk comes from a representation of the environment in which there is a **dichotomy between nature and society**.
- Peasant become dependent on river engineering to survive. Landscapes and lifestyles of the plain are now structured by river engineering. Villagers do not receive compensation for the plot they have lost **>> Increasing vulnerability to hydrological risks, due to the lack of consideration of local livelihoods in the land management policies.**

## River control and territorial administration

**Embankments** built to increase agricultural production, to control river dynamics, to protect land and property from floods :

- 2000 BC – First "hydraulic civilizations"
- 12<sup>th</sup> to 19<sup>th</sup> century – Ahom kingdom
- 1824 to 1947 – British rule
- Since 1950 – Government of Assam

Built to dominate nature, the embankments immobilise territories, however the river takes back ancient channels during floods, and poorly maintained facilities become ineffective, due to breaches caused by erosion.

Administrative boundaries defined by local authorities freeze territories and restrict mobility.

- Appropriation of spaces are constrained and regulated by administrative and land divisions.
- Administrative restrictions on territories limit the mobility of people

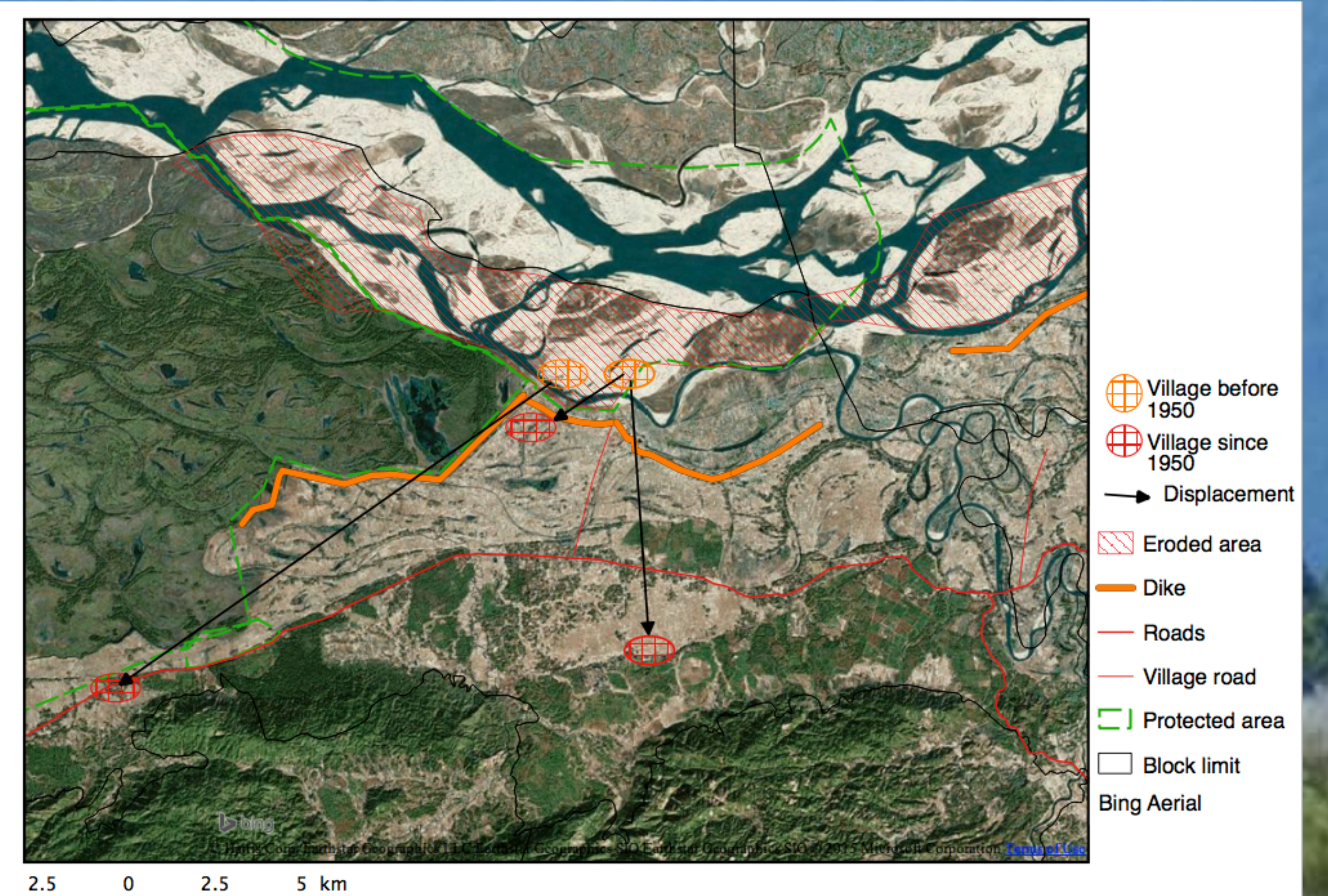
### Do embankments effectively protect or contribute to increase risks?

## Erosion – Accretion and Floods

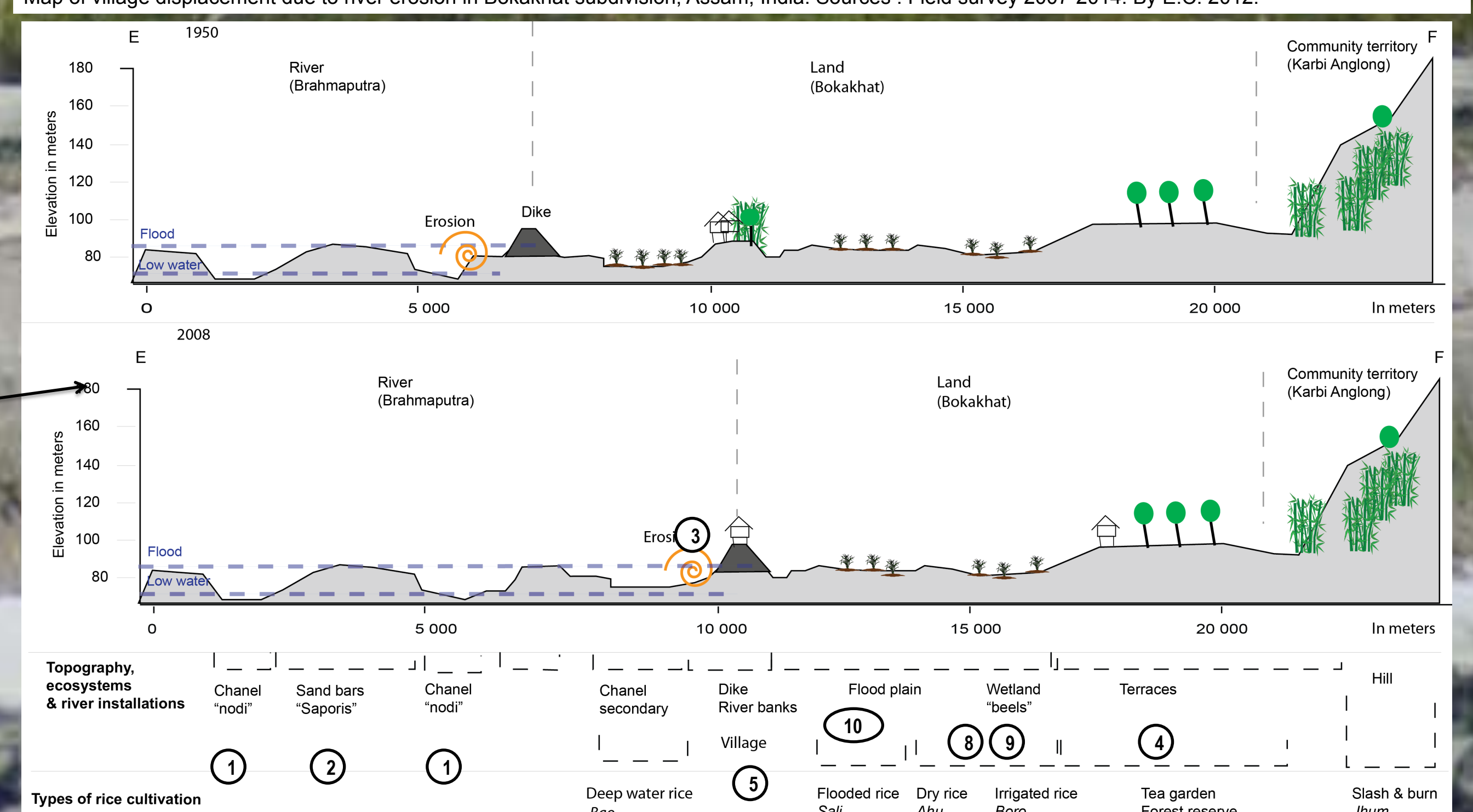
- Adaptions of livelihood & agricultural activities to hydro-geomorphological hazards and to a diked environment.
- Protected by embankments, villagers no longer used to face floods > not prepared when the river suddenly breaches embankments. major flash flood > inundation of agricultural lands and villages, much of the rice production damaged > large amounts of sand, making the land unfertile.

## Peasant's mobility when facing hazards

- Villages washed away but communities can barely transfer their dwelling-places/ records restrict their movements.
- Families landless become increasingly vulnerable to hydro-geomorphological hazards.
- No land available for resettlement, no compensation as villagers still do not have documents to prove their ownership.



Map of village displacement due to river erosion in Bokakhat subdivision, Assam, India. Sources : Field survey 2007-2014. By E.C. 2012.



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