



Disaster Resilient Habitat

A dire need across flood typologies

मेघ पाईन अभियान
Megh Pyne Abhiyan

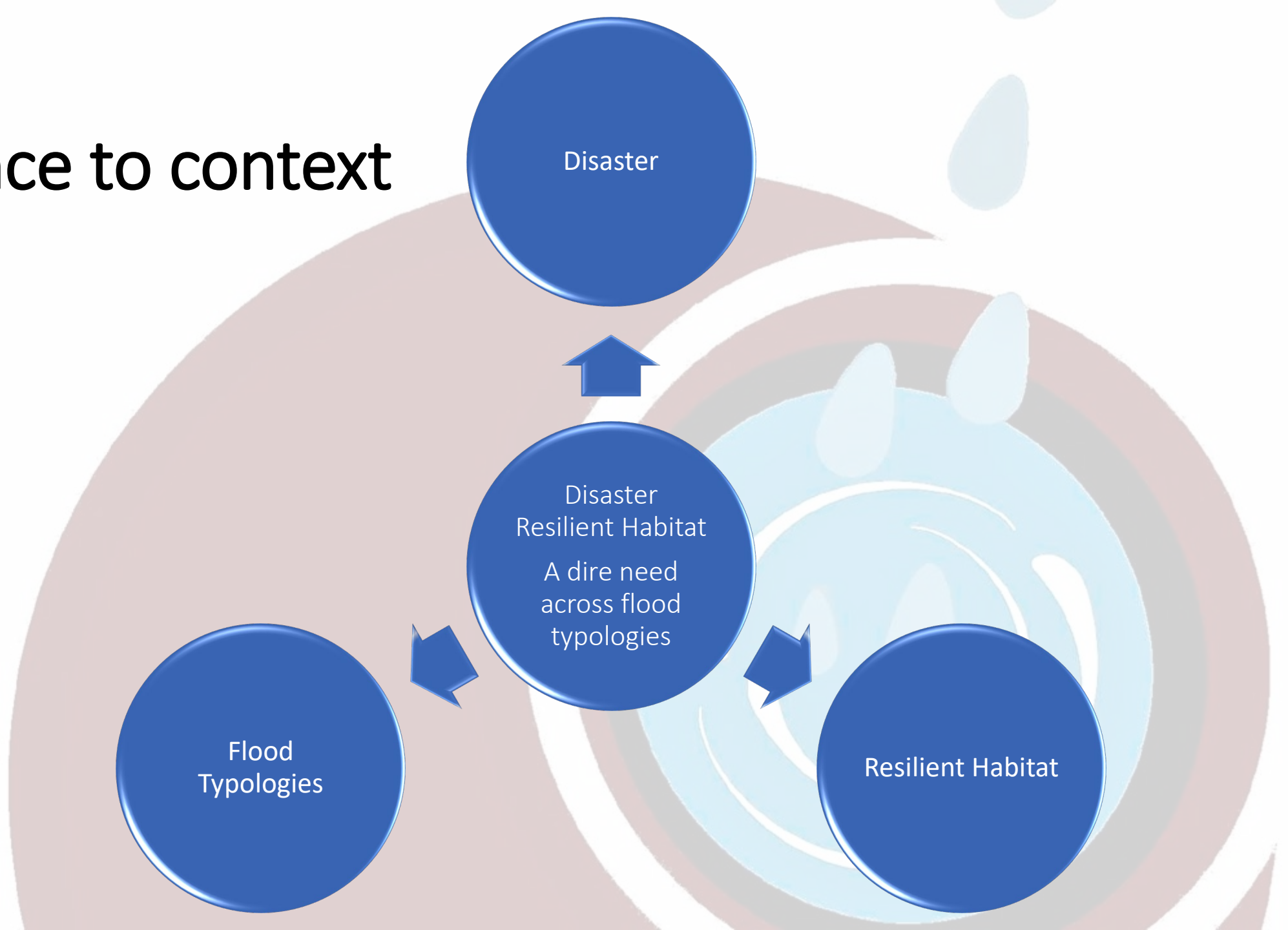


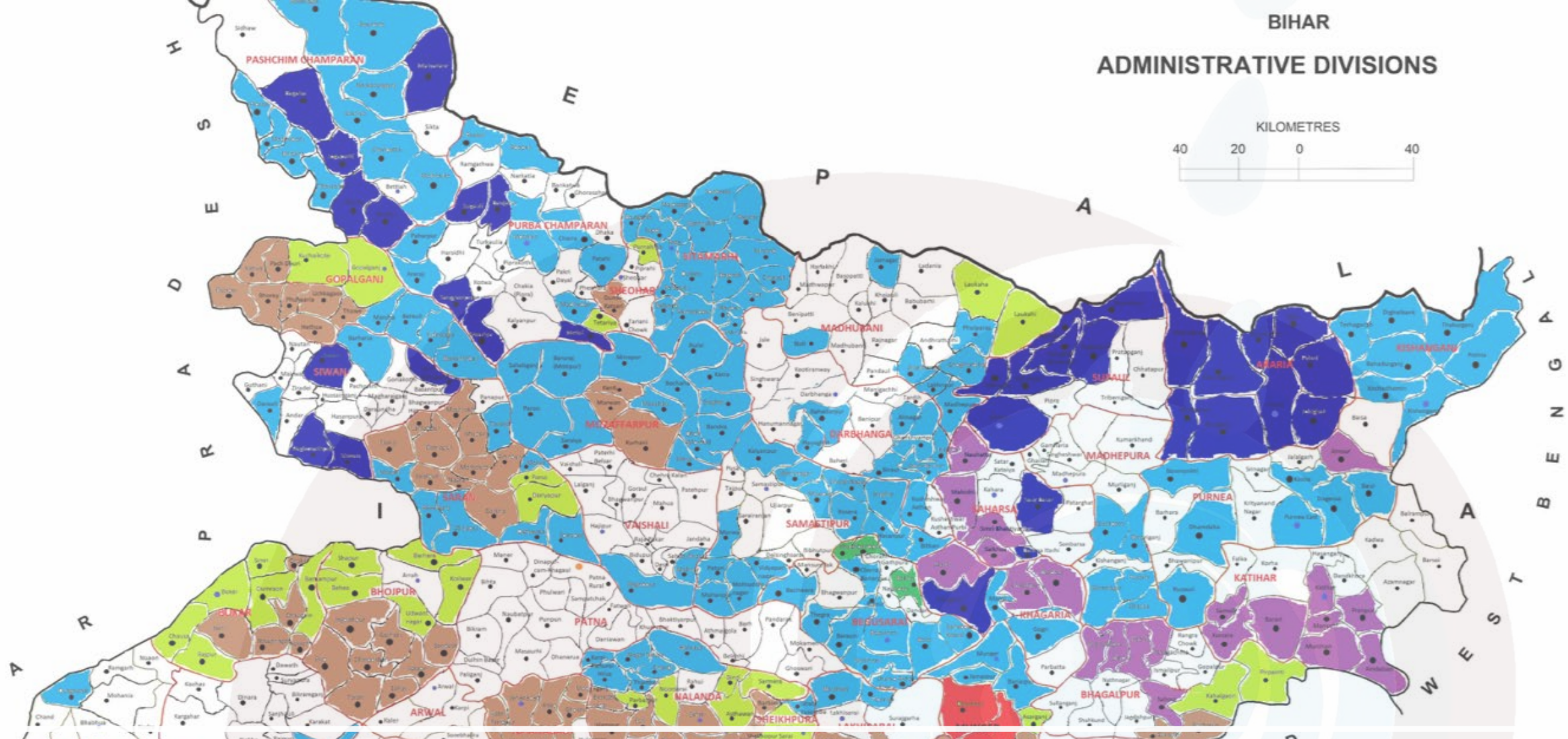
Building a Resilient Koshi Basin
Koshi Disaster Risk Reduction (DRR) Knowledge Hub Country
Consultation

Gyan Bhawan, Samrat
Ashok Convention Kendra
Patna

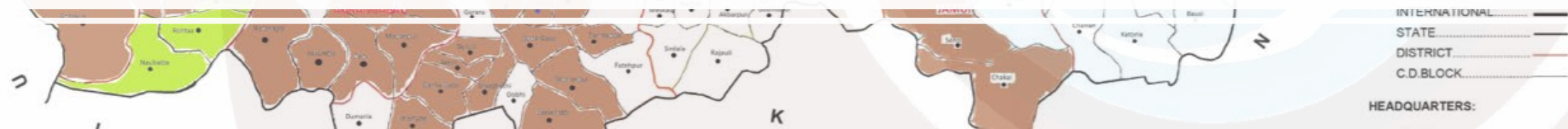
July 30-31, 2019

Reference to context





Multiple Hazards: Mapping at the Block Level



Flood/Heavy Rain Fall Report

[As on 30-07-2019 at 04.00 PM]

Name of State/UT- BIHAR

		Till date (during current monsoon season)	During last 24 hours
i	Rainfall (As per IMD Report) Dated- 30.07.2019	Actual- 515.2 (in mm) Normal- 506.4 (in mm) Dep- (2)	-
ii	No of districts affected with Name	1. Araria, 2. Kishanganj, 3. Madhubani, 4. East Champaran, 5. Sitamarhi, 6. Sheohar, 7. Supaul, 8. Darbhanga, 9. Muzaffarpur, 10. Saharsa, 11. Katihar, 12. Purnia, 13. West Champaran	1. Araria, 2. Kishanganj, 3. Madhubani, 4. East Champaran, 5. Sitamarhi, 6. Sheohar, 7. Supaul, 8. Darbhanga, 9. Muzaffarpur, 10. Saharsa, 11. Katihar, 12. Purnia, 13. West Champaran
iii	No. of village/Panchayat effected	1269 (Panchayats)	16 (Panchayats)
iv	Population affected (In lakhs)	88.47	2.87
v	Human lives lost (district wise)	Total- 127 1. Araria- 12, 2. Kishanganj- 7, 3. Sheohar- 10, 4. Sitamarhi- 37, 5. Supaul- 3, 6. Darbhanga- 12, 7. Purnia- 9, 8. Madhubani- 30, 9. East Champaran- 2 10. Saharsa- 1, 11. Muzaffarpur- 4	-
vi	No of missing	-	-
vii	No. of Injured	-	-
viii	No. of Houses Damaged	After survey	-
ix	Animal deaths	After survey	-
x	No. of persons evacuated	1,25,000	-
xi	No. of relief camp opened	199	4
xii	Inmates in the relief camps	1,16,653	1,250
xiii	Relief material distributed	Information being gathered	0
xiv	Total crop area affected (in hectares). As of now	After survey	0
xv	Infrastructure Damage	Assessment being made	0
xvi	GR Distribution to the affected families	No of Families Amount (Rs in Crore)	- -

Assistance Provided by Government of India:

i	NDRF	17	0
ii	Air Force, Navy , Army & SSB (RRT)	3	-
iii	Other Central Government Ministry/Department	0	0

Deployment of State Forces:

i	SDRF	7	0
ii	State Police/Fire	-	-
iii	Boats/Motor Boats and Country Boats	423	0

Sd/-
(M RAMACHANDRUDU)
Addl. Secy.

Disaster Management Department, Bihar

Dated.- 30-07-2019

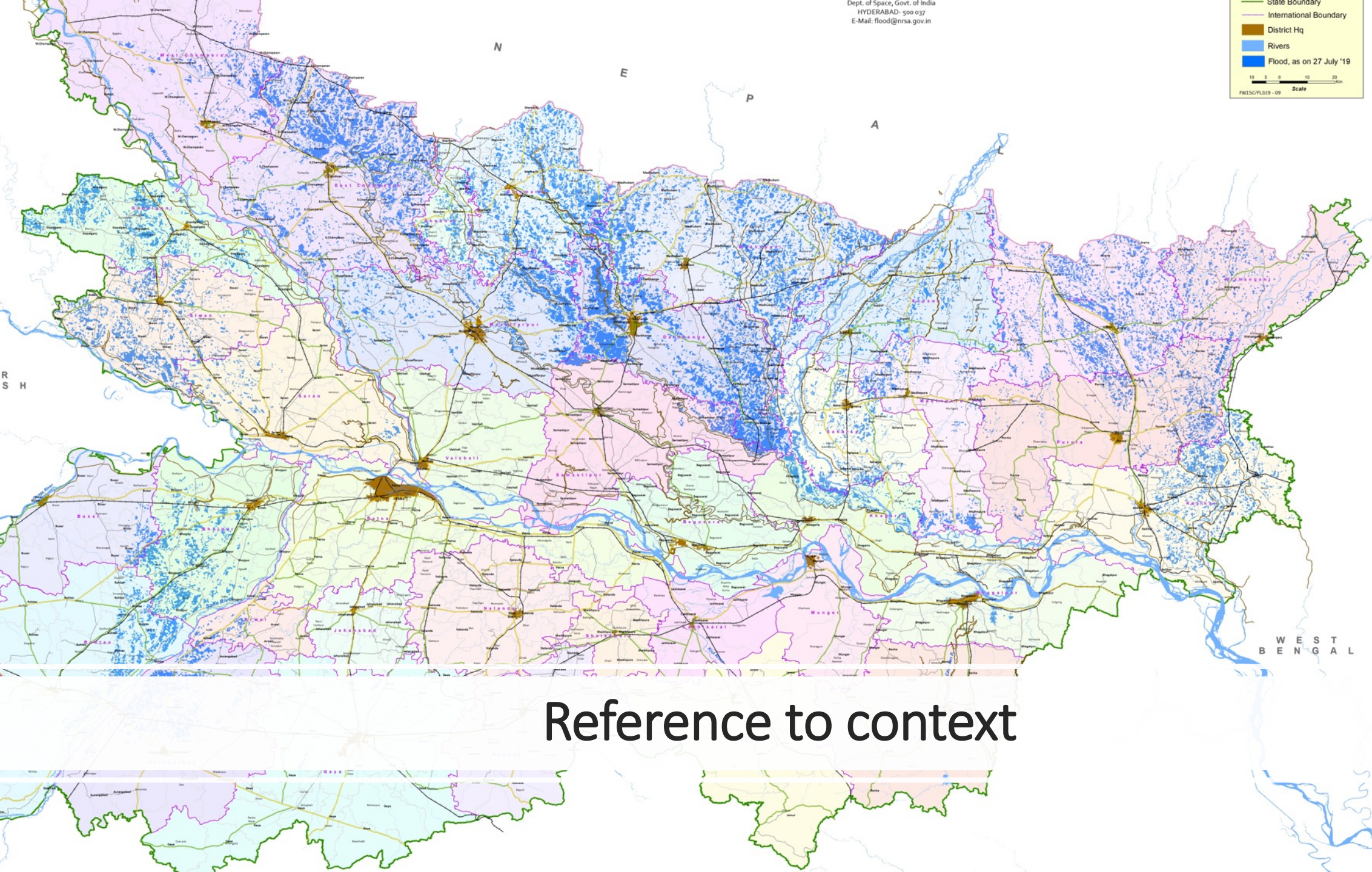
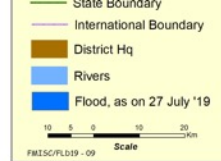
Memo No.- 2392/DM, Patna-23

Copy Forwarded to Principal Secretary C.M. Secretariat, Bihar, Patna/ OSD to chief Secretary, Bihar, Patna/Secy PRD
Deptt, Patna/ IT Manager/ Executive engineer, CWC Division- 05, Boring Road, Patna/ Joint Secretary MHA, New Delhi/ DG
NDRF, New Delhi/ Assistant Commandant, NERC, New Delhi

(M RAMACHANDRUDU)
Addl. Secy.

Disaster Management Department, Bihar

Reference to context



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Bihar and floods are synonymous, which can be easily substantiated.

2017 , 17.1 million people were affected

2015, 3 million were affected

2013, 20 districts were affected impacting lives of 7.23 millions

2010, 0.718 million people were affected

2007, floods devastated 25 million people

2004 it created havoc in lives of 21 million people

1987 it affected 28.2 million population

1974 it disrupted lives of 16.39 million people

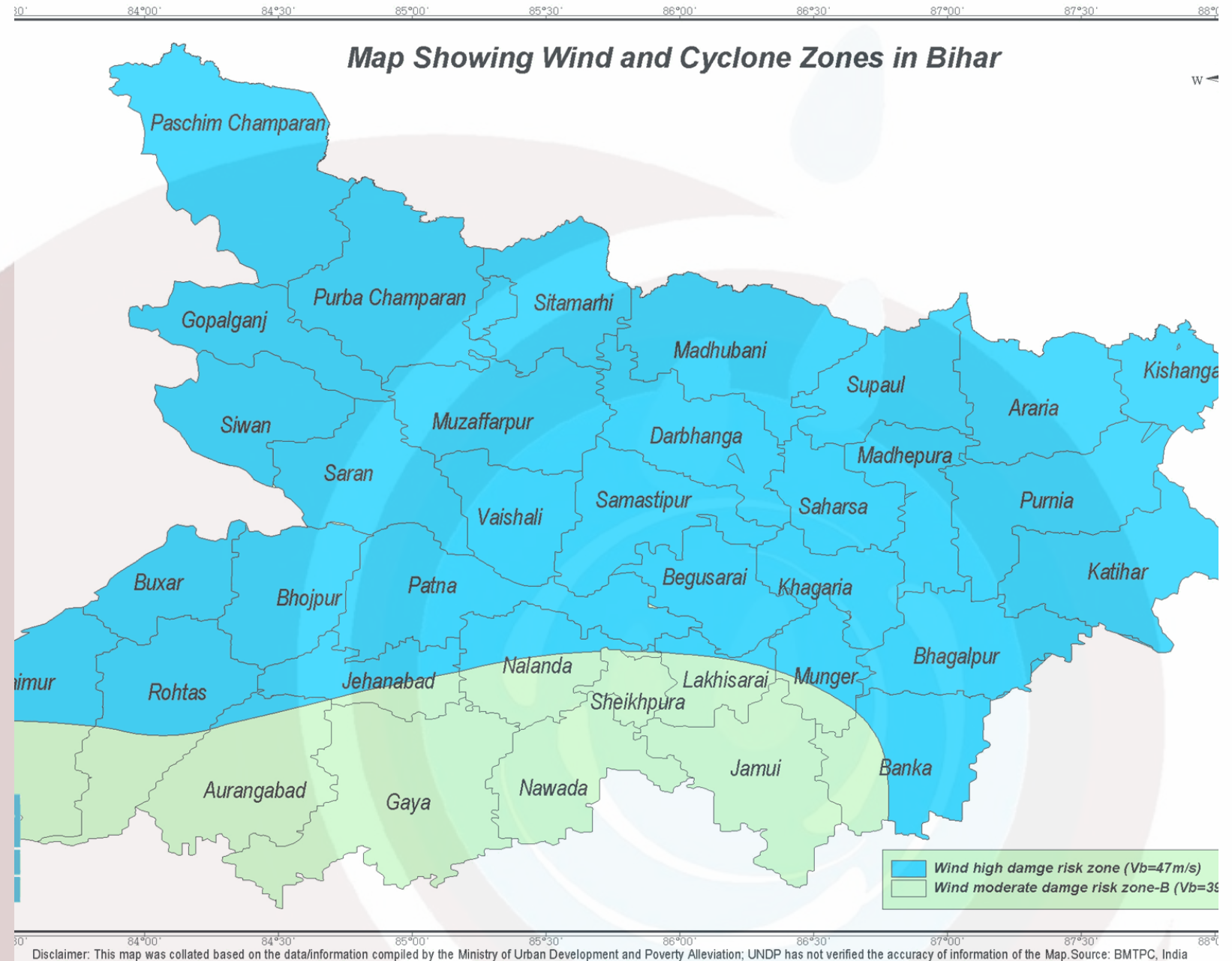
2008, a total of 3.3 million population was affected

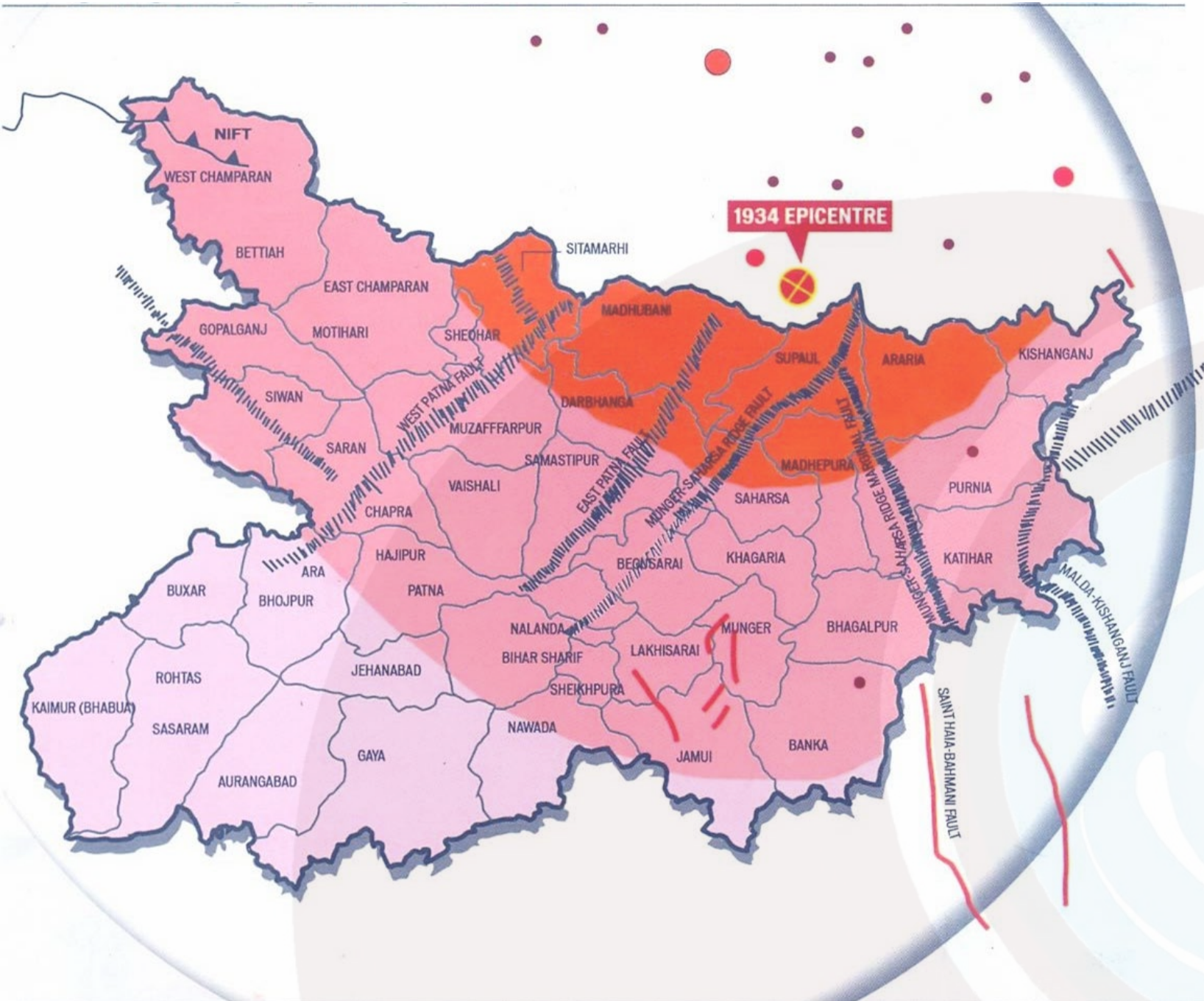
2019, as of now 0.884 million impacted

Sources

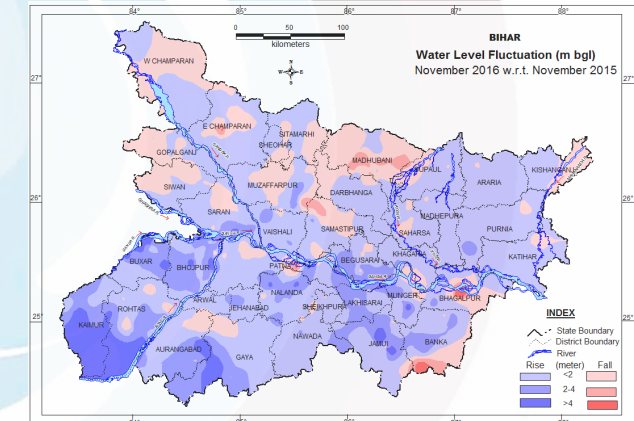
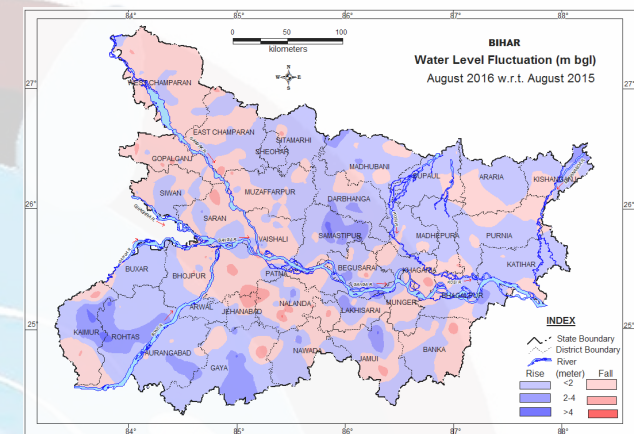
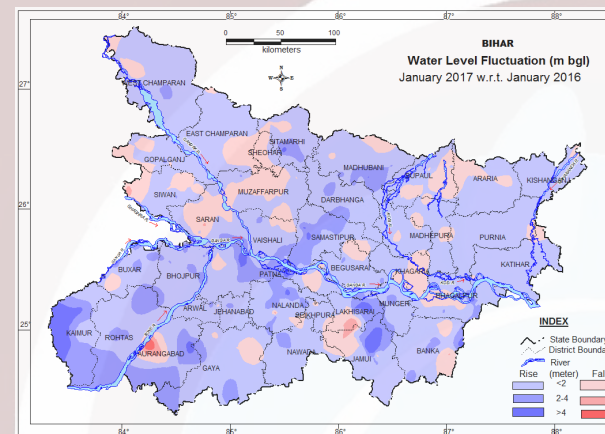
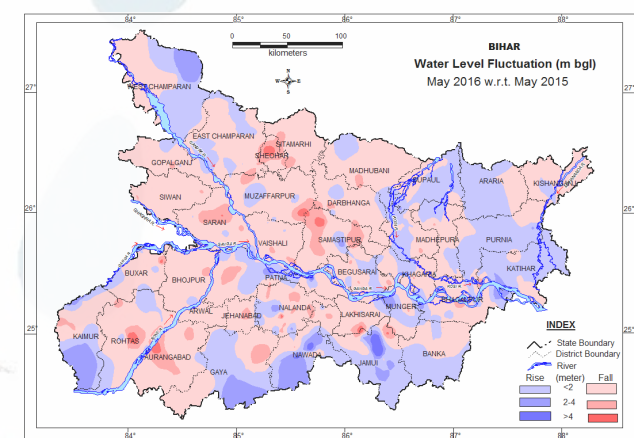
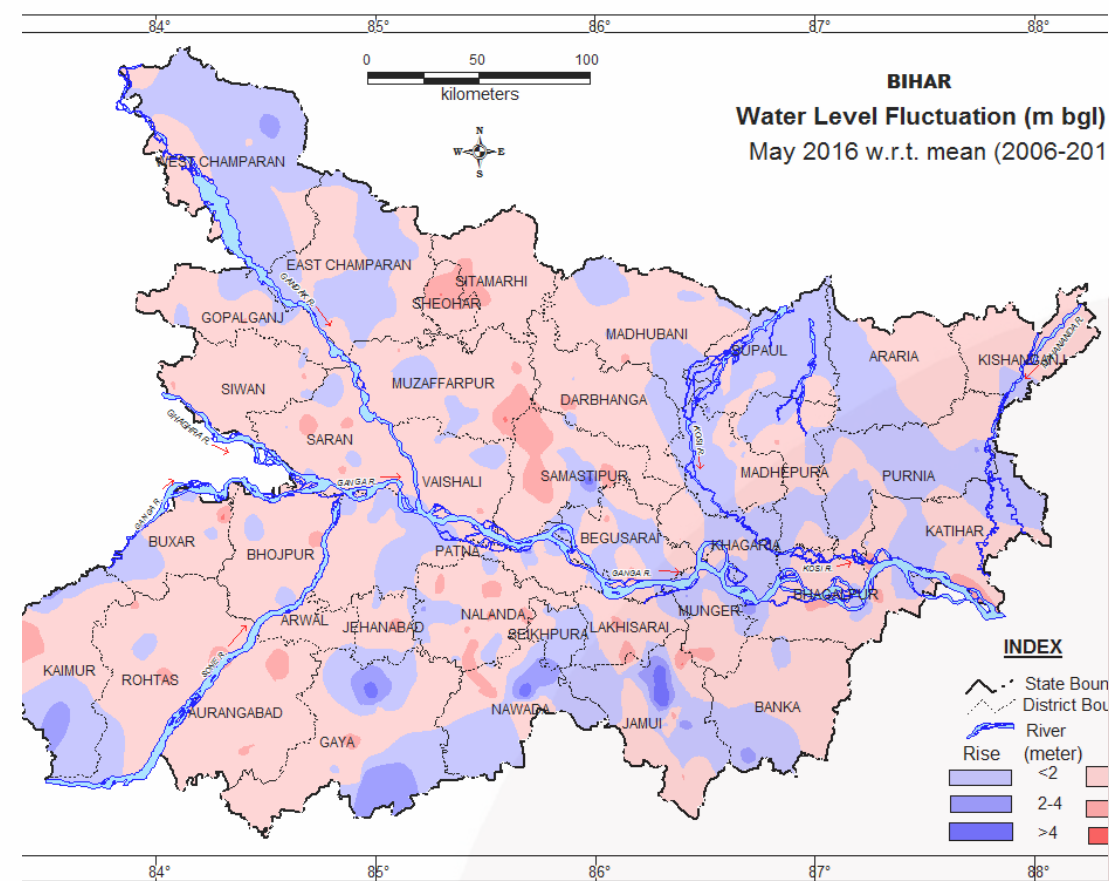
- https://en.wikipedia.org/wiki/2017_Bihar_flood (2018)
- <http://disastermanagement.bih.nic.in/> (2018)
- Mishra DK (2007). Bihar Floods of 2007 – Some Lessons for Everyone; Dams, River and People; SANDRP, New Delhi
- Department of Planning and Development (2008). Kosi Calamity – Rehabilitation and Reconstruction Policy, Resolution; Government of Bihar

Reference to context





Reference to
context



Source – Ground Water Year Book – 2016-17;
Central Ground Water Board

The major area (63% area) of the State has shown fall in water level less than 2 m whereas the segment of 2 – 4 m observed in only 3% of total area (13 Nos. NHS). The fall of water level more than 4m has been recorded in only 8 wells located in Sheohar, Nalanda, Muzaaffarpur, Lakhisarai, Jamui, Buxar and Aurangabad district.

Reference to context

Ground Water Quality Status of Bihar 2009
Arsenic > 50ppb, Fluoride > 1.5mg/l & iron > 1mg/l
in ground water sources



ARSENIC

• <50ppb

• >50ppb

FLUORIDE

• <1.5mg/l

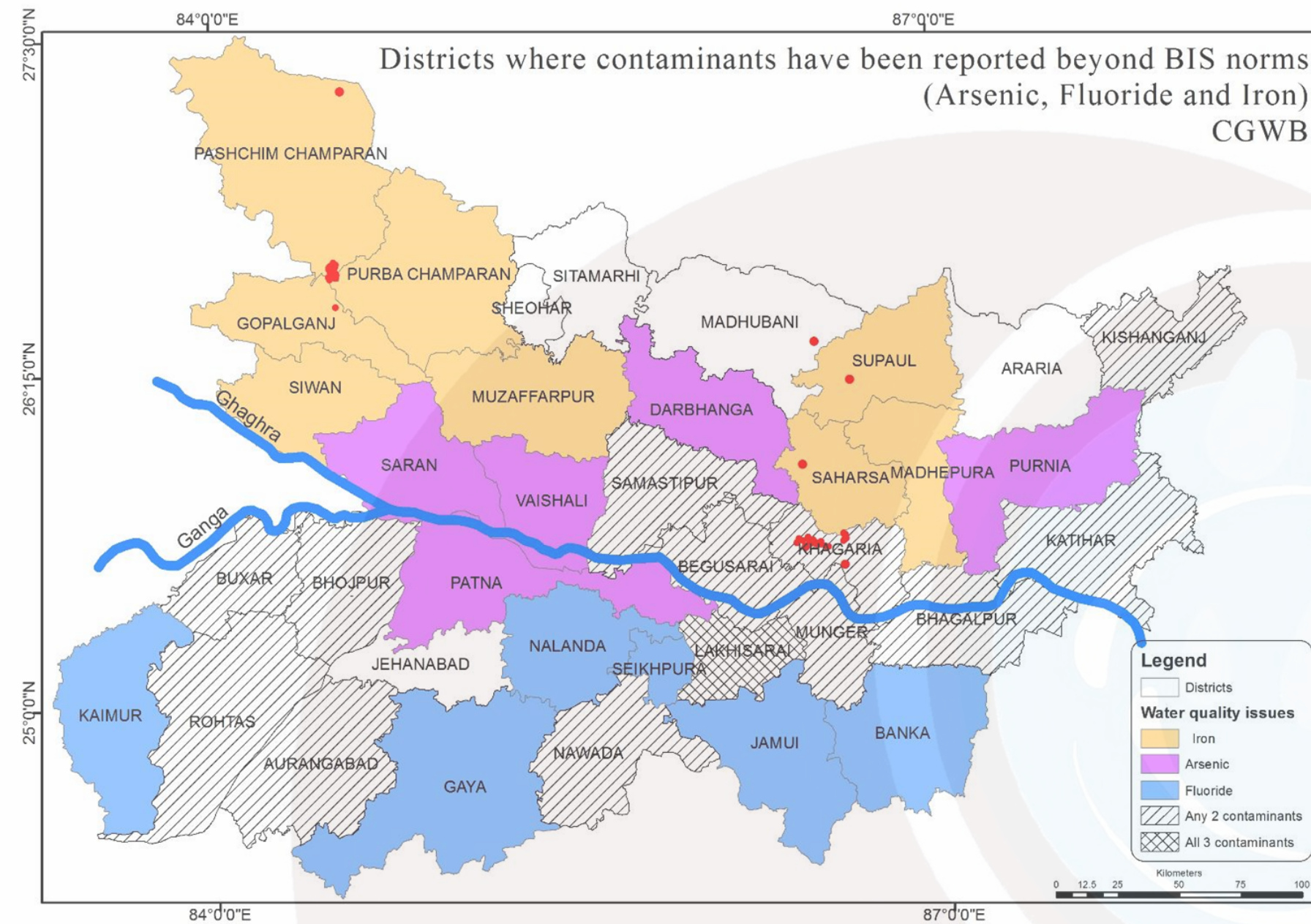
• >1.5mg/l

IRON

• <1mg/l

• >1mg/l

Reference
to context

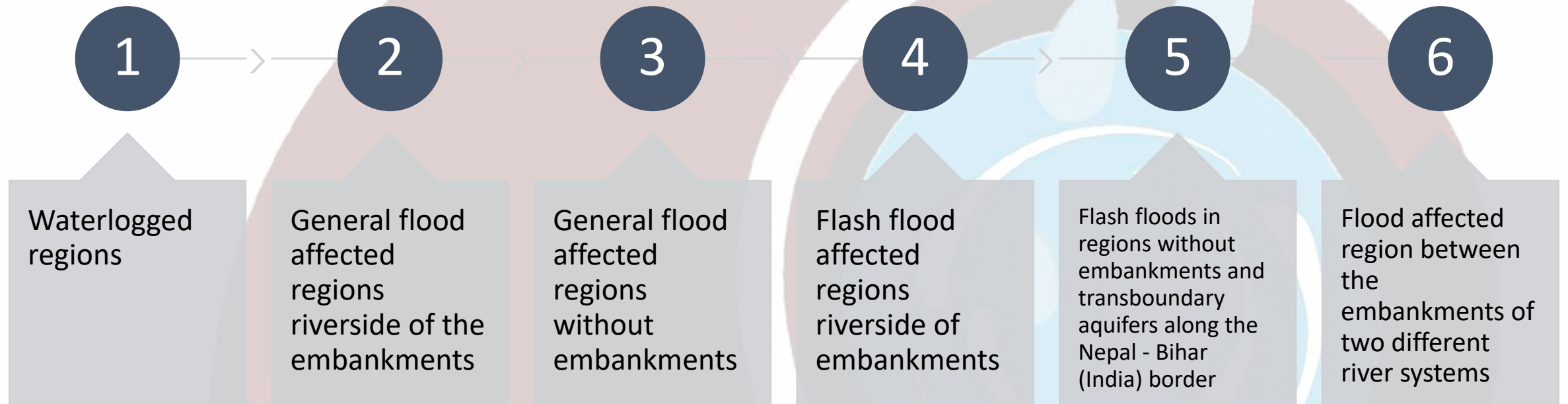


Reference
to context

Deciphering flood resilient habitat

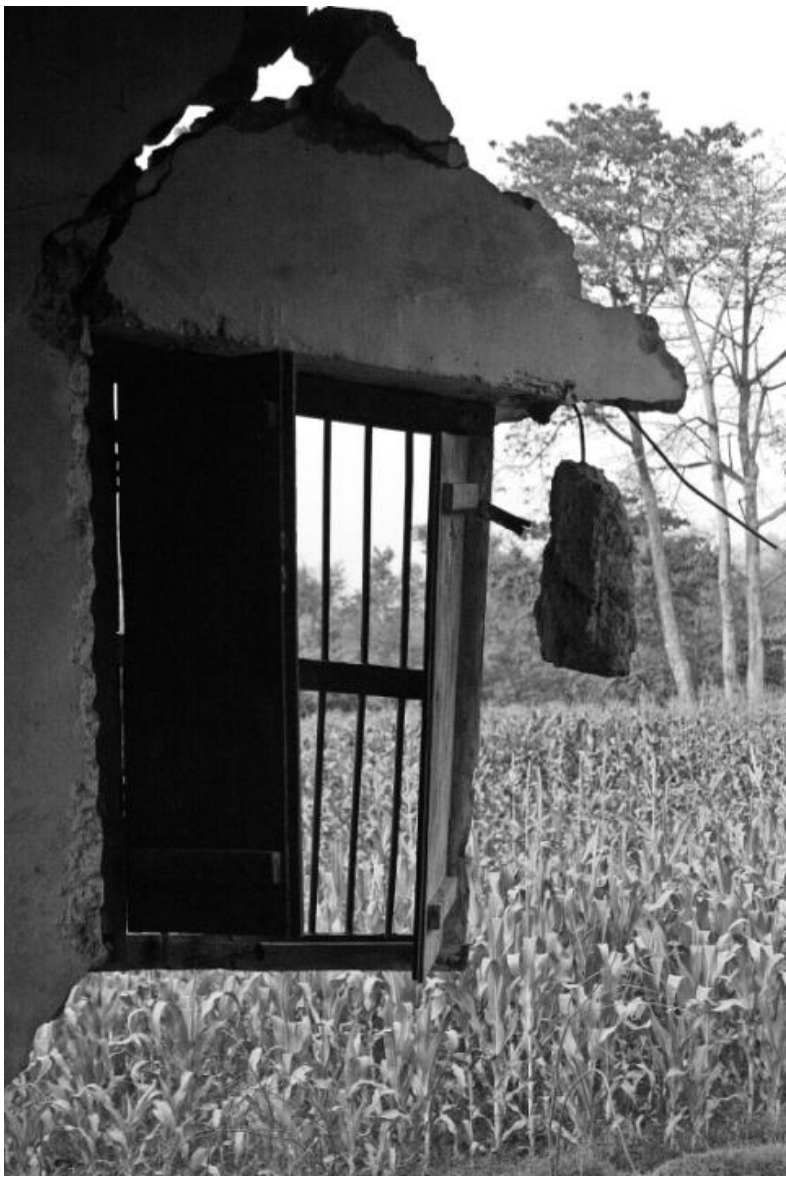


Flood typologies



Co-existence with floods







Temporary Rainwater Harvesting (during floods)



Decentralized water testing



Flood resilient dug well





Matka filters



Phaydemand Sokta and Shauchalay

Materials used for construction by community

MATERIAL	ADVANTAGES	DISADVANTAGES	USED FOR
Bamboo	<ul style="list-style-type: none"> • *Easily available • Light-weight • Easy to repair 	<ul style="list-style-type: none"> • Rots easily • Needs replacement every year or two • Damaged easily in flood/andhi 	Structural material for frame of house [khamba, thuni]
Kharai [grass]	<ul style="list-style-type: none"> • *easy to relocate/ lift house higher • Easily available – natural resource [all year round] • Reparable • Cheap • Local skill available 	<ul style="list-style-type: none"> • Needs replacement regularly • Not desirable as roofing since it won't prevent leaks • Catches fire easily 	To build walls [taati] and roofs. As fuel
Dabi [grass]	<ul style="list-style-type: none"> • Easily available [perhaps not all year round] * • Excellent roofing material, prevents leaks • Longer lasting, needs replacement only 3-4 years 	<ul style="list-style-type: none"> • More expensive than kharai • Catches fire easily 	Roofing material
Teak	<ul style="list-style-type: none"> • Long life 	<ul style="list-style-type: none"> • Expensive 	Frame of house [ladahi and thuni]
Seesam	<ul style="list-style-type: none"> • Long life 	<ul style="list-style-type: none"> • Expensive 	Frame of house [ladhai and thuni]
Simar *	<ul style="list-style-type: none"> • Easily available 		Frame of house [ladhai and thuni]

HOUSING

THREATS TO HOUSES DURING EXTREME EVENTS

- Damage to House Structure
 - ❖ Entire structure washed/blown away (*udiya jaana*)
 - ❖ Parts of house damaged and/or fallen (*baith jaana*)
- Loss of Household Assets
 - ❖ Loss/damage to food grains
 - ❖ Loss/damage to fuel

PEOPLE'S PERCEPTIONS OF A FLOOD-RESILIENT HOUSE

- Permanent structures
 - ❖ 'Durable' materials like brick and tin would withstand force of natural elements, and test of time
 - ❖ Houses raised on high plinth will prevent water from entering inside

Housing

On plinth

- If the plinth of the house is raised above flood level, then water would not enter.
- People constructing bamboo-thatch houses in these regions, raise their houses regularly by filling in more mud.
- A longer lasting house should be made 'pukka'; i.e. with brick and mortar.
- However, such a structure would require a large number of bricks, which would increase the cost.

On columns

- A house raised on columns would also be safe from floodwaters, and would allow the waters to flow, mostly unimpeded.
- Such a design is not native to the region, but migrants from the village have seen like structures in parts of Nepal.
- The columns would have to go at least nine feet below ground, and start from 'baliyar matti'; compact as opposed sandy layer of soil
- RCC columns are most preferred followed by wood such as teak, over bamboo as the latter rots easily and needs regular replacement

Housing

Flood resilient
habitat

