Prevention of Flood through Indigenous Practices : Construction of Ponds

(The pond in medieval town Thimi, Bhakapur)

(Construction of Giant Cistern in Japan)

Presented by
Prof. Dr. Jiba Raj Pokharel
Nepal Center for Disaster Management

Flood Prevention in ancient times

- Chanakya in the fourth century BC suggested for the construction of ponds
  - To prevent flood
  - For water harvesting
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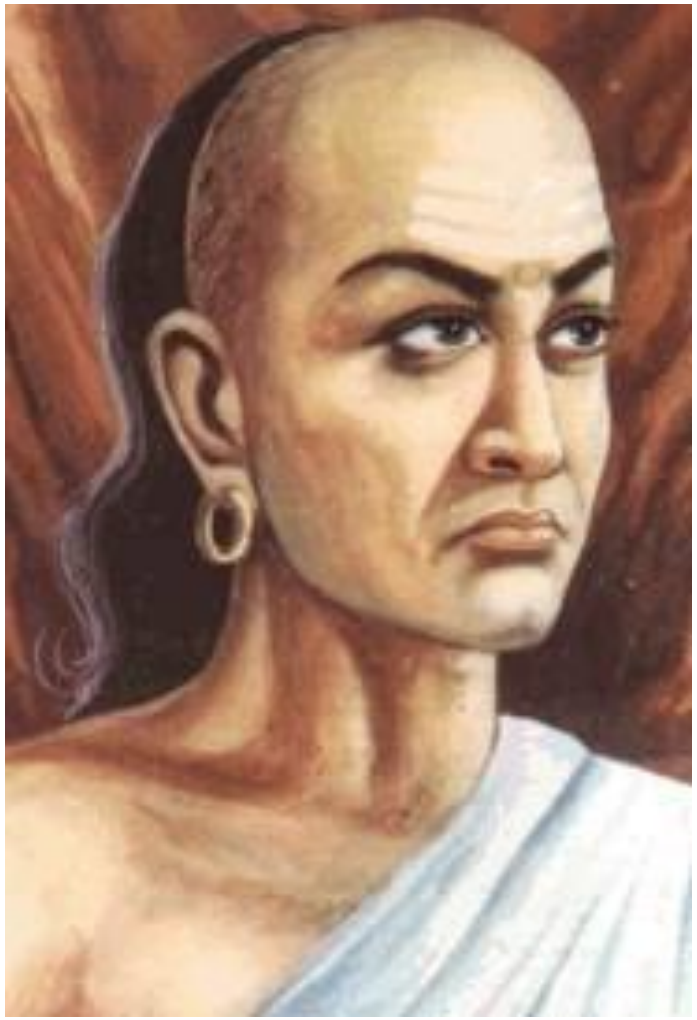
- One can see ponds in the cities of Kathmandu Valley
- In Terai, also several ponds can be observed



PONDS IN NEPAL

Ponds in Thimi (Source: Google)

Ponds in Janakpur (Source: Google)

FLOOD IN NEPAL

- Nepal's past about flood is very little known
- We have data only from the seventies
- From 1971-2007
  - Events 2720
  - Deaths 2936
  - Affected 3367964 (Source Nepal Country Report, 2007)
- From 2010-2019
  - Events 1514
  - Deaths 796
  - Affected 64422 (Source NDRMAA, 2020)

FLOOD OF THE YEAR 1993 IN NEPAL

- Deaths 1336
- Missing 201
- Injured 110
- Families affected 85451
- Houses destroyed 18322
- Houses damaged 20721
- Public buildings 452
- Land Loss (ha) 57013
- Livestock loss 25628
- Roads damaged 366
- Bridges damaged 213
- Dam damaged 34
- Irrigation channels 620
- Total Estimated Loss Nr 4901 mil

FLOOD

- Due to the Bund constructed by India
- Due to the east west embankment constructed for the postal road without appropriately sized culverts
- Due to the climate change, cloud burst

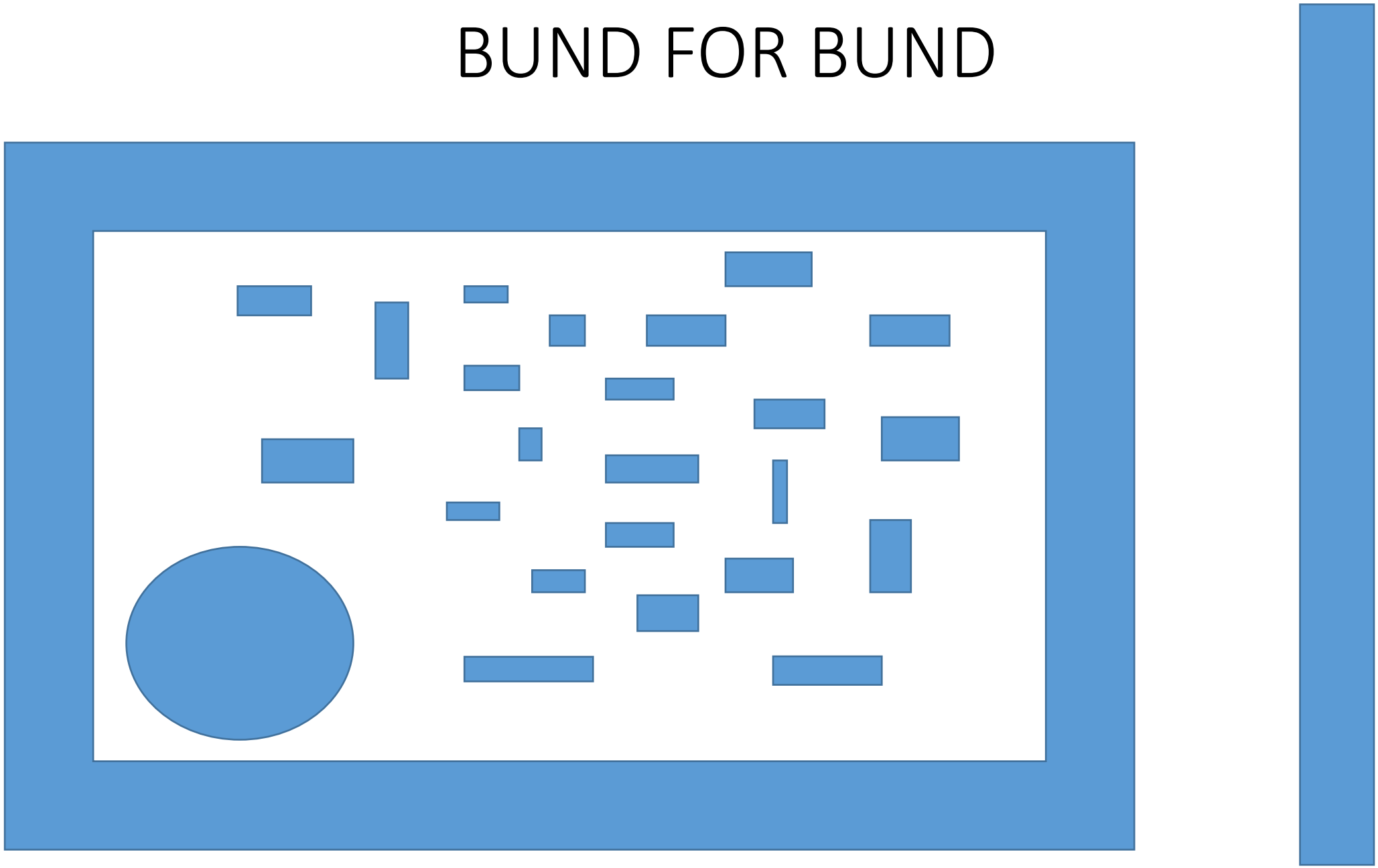
BUND CONSTRUCTED BY INDIA

- Bund constructed by India
- It has led to flood in Nepal

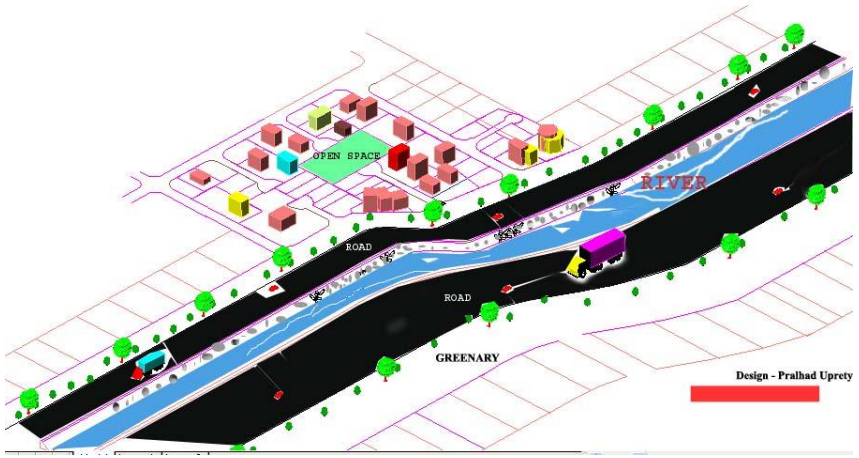
INUNDATION DUE TO BUND

- The villagers are suffering a great deal due to the bund

BUND FOR BUND



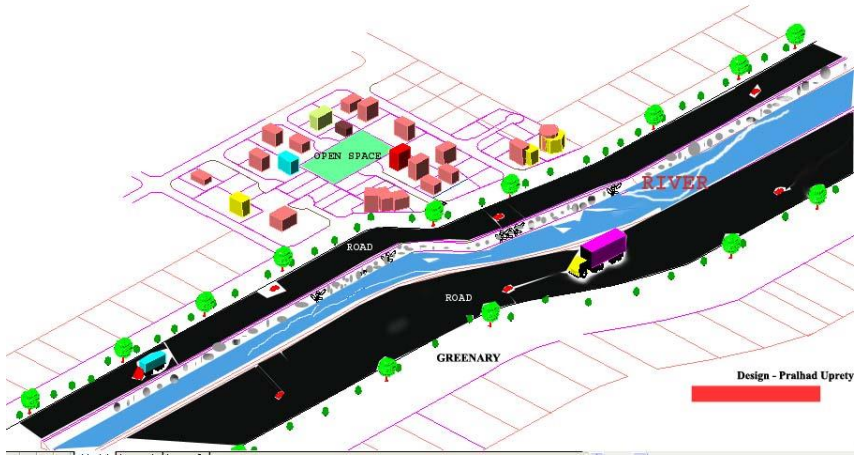
LAND ENCHROACHED BY RIVERS



LAND POOLING FOR RATU RIVER

- 293 HECTARES OF LAND AFFECTED BY THE RIVER
- 30 PER CENT RETURNED TO THE OWNERS
- 20 PER CENT FOR THE DIKE AND THE INFRASTRUCTURE
- 50% OR 147 HECTARES LAND SOLD

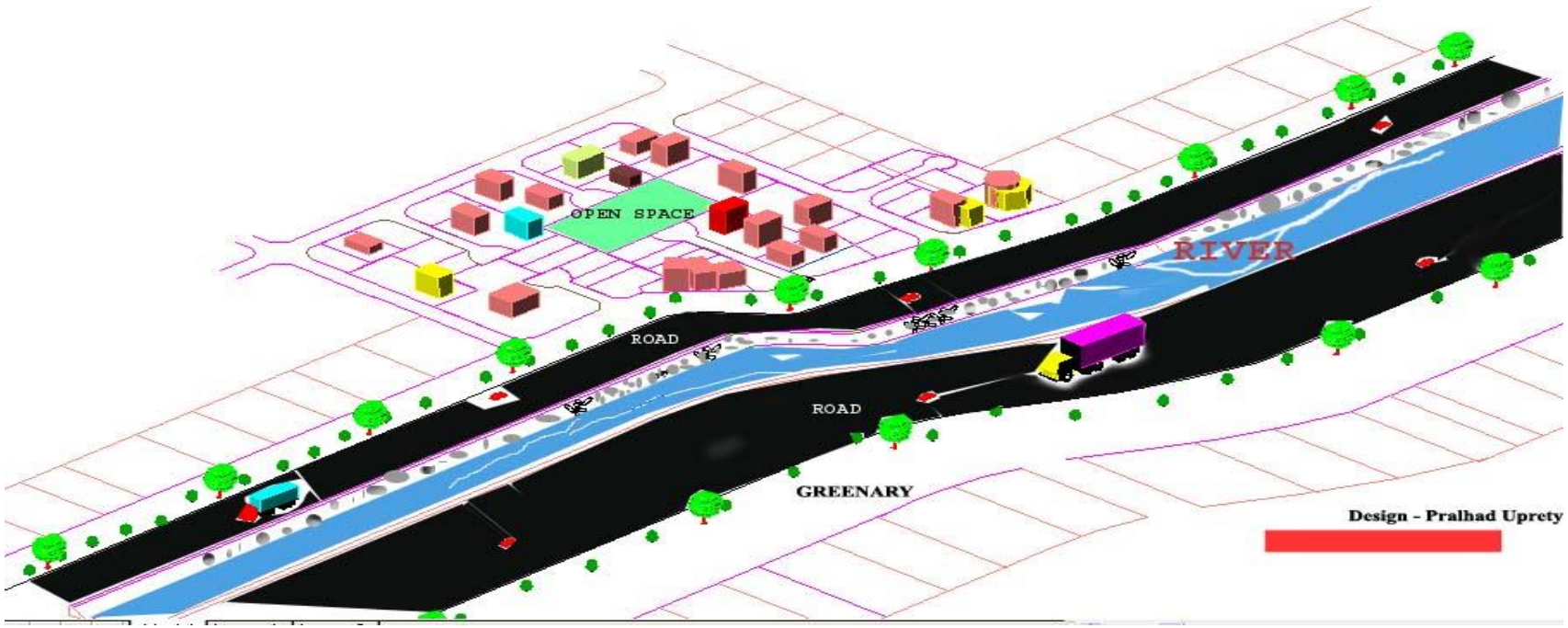
LAND ENCHROACHED BY RIVERS



RATU RIVER

- 143 HECTARES IS 220 BIGHAS
- IF IT IS SOLD AT Rs 100,000 PER KATHA, IT WILL FETCH 440 MILLION
- THE COST FOR CONSTRUCTION IS 450 MILLION

Land Pooling for River Flood Management



CHINA

- Ancient era
  - Guns and Yu, the great flood control
  - Li Beng's flood control
- Middle ages
  - Uniting water transportation and flood control
  - Wang Anshi's agriculture supply
- Early Modern Period
  - Gao Bin's division of the river
  - Water to trash solid, reduce the flood
- Modern Ages
  - Brick Dams
  - Reinforce shoal and protect the dam
- Present Age
  - Raise dyke, construct dams
  - Structural and nonstructural measures

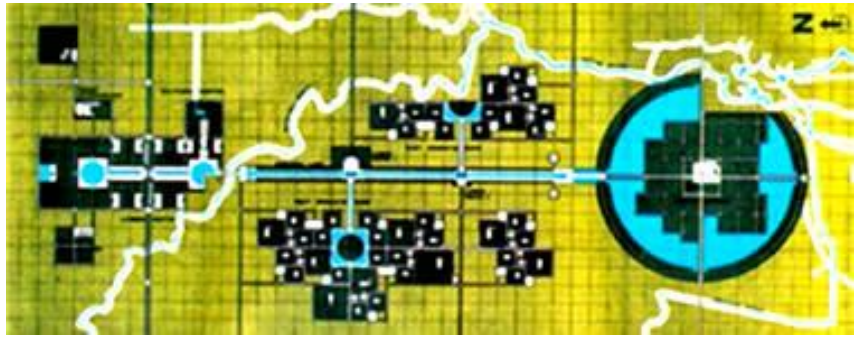
JAPAN

- Ancient era
  - Drains and embankments
- Middle ages
  - Building Ordinance, Public water principle
  - Flood control
- Early Modern Period
  - Straighten the rivers
- Modern Ages
  - Low water Channel control
  - High water flood control with dams
- Present Age
  - Green Dam

FLOOD RESISTANT DESIGN

- Buddha
- Dharma
- Sangha

- Levee
- Channel

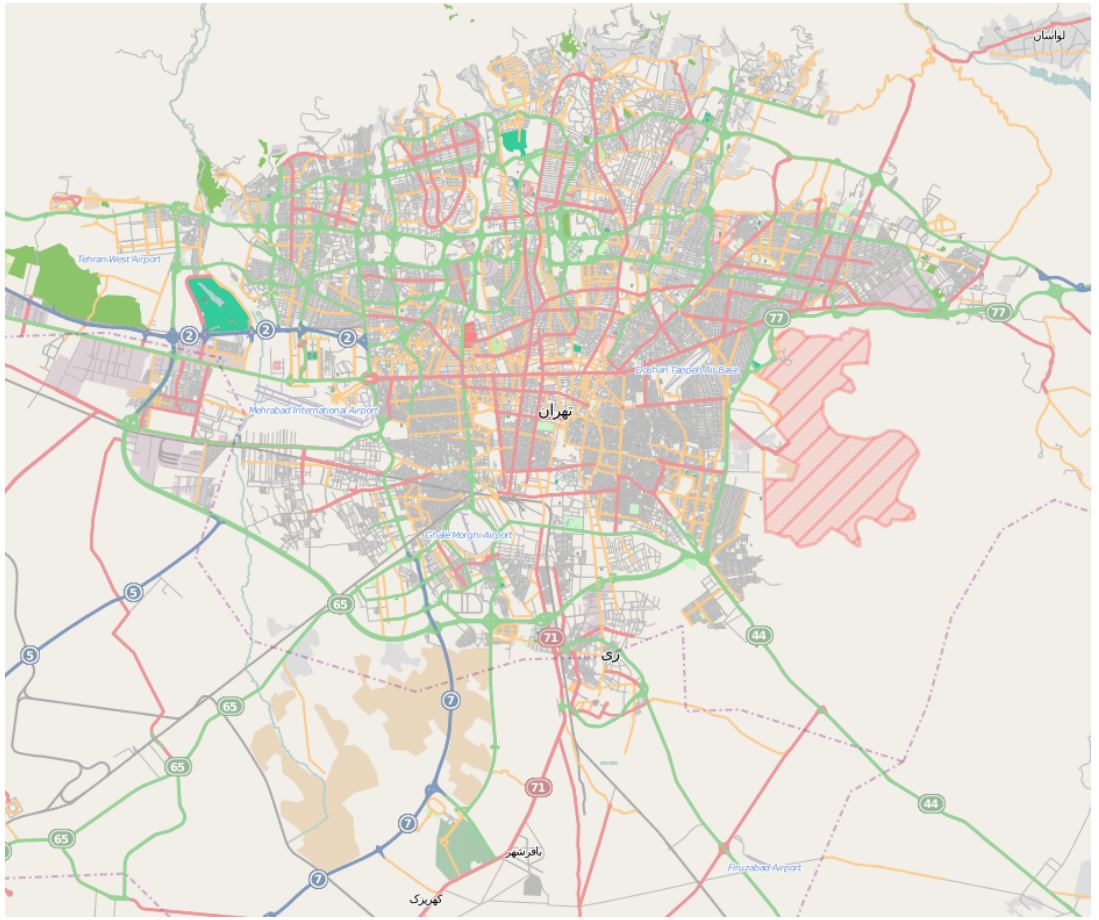


RETENTION PONDS IN MALAYSIA

- Retention ponds have been used successfully to prevent flood in Malaysia.
- Aman Lake was used as a retention pond
- The case of USM Main Campus

DETENTION PONDS IN IRAN

- This study addresses the Golestan City located in Tehran province of Iran to attenuate its urban Storm water Drainage storage system
- It has been found that a probable 4.5 cu m per sec flood peak can be brought down to
  - 3 with two detention ponds
  - 2.5 with three
  - 2 with 4



CONSTRUCTION OF PONDS

- A 10,000 cubic meter pond will prevent flood in an area of 1 Sq Km (Quinn, 2015)
- If we provide 2meter deep ponds, area will be 5000 sq m which is 0.5 per cent.
- Fishery can be promoted in these ponds
- Paddy 3.5 T/Hectare, Fish 4.9 T/Hectare

Pond in Pharping

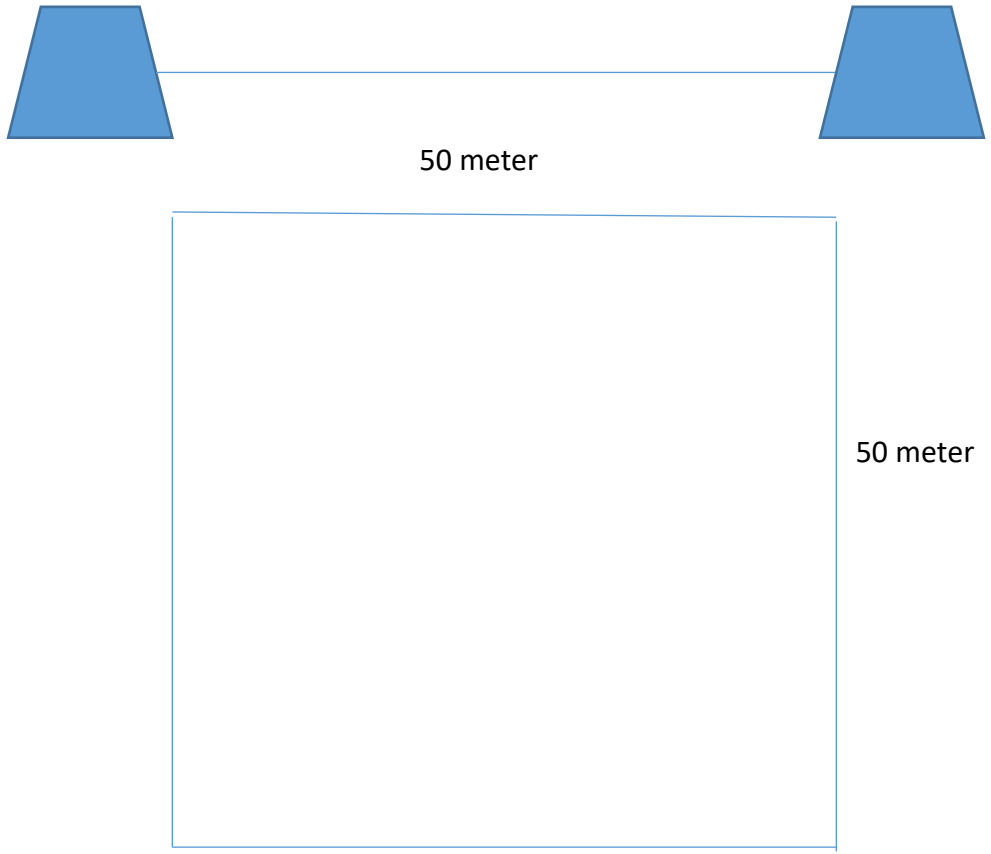
CONSTRUCTION OF PONDS

- Government rate of paddy varies from Rs 22 to 24 per Kg
- The price of fish is Rs 400 per Kg

Pond in Patan

CONSTRUCTION OF PONDS

- Minimum size of a feasible pond is said to be of 0.25 hectare or 2500 sq m or 50m x 50m or 200 perimeter
- The ideal depth is 1.5 meter.
- Excavating one meter, the earth will be 2500 cu m
- The cost will be Rs 270000
  - Embankment for a slope of 1:1 outside and 1:2 inside, and 2 meter at top the area
  - Cost for excavation will be Rs 300 per cu m or 750000 and 150000 for turfing making it 900000
  - Price of 2100 cu m (420 trip) will be 630000 at 1500 per trip and the cost will be 270000 for construction



MODUS OPERANDI

- The local Government should initiate this program.
- It should enter into agreement with the Forest consumer group which is in charge of about 1.2 million hectare of forest
- The Local Government should look after remaining 3.6 million hectare
- Small ponds could be constructed using bamboo and plastic

THANKS

Any questions ?