

# OPTIMIZING ROAD INFRASTRUCTURE FOR FLOOD PREPAREDNESS AND EMERGENCY AND POST EMERGENCY RESPONSE

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# ROADS AND FLOOD EVENTS



1. Avoid that roads create floods
2. Improve flood defenses with roads
3. Use roads during flood emergency
4. Use roads post flood emergency

# 1. Avoid that roads/bridges create floods

- Road change catchment hydrology – concentrating run-off in smaller number of drainage paths
- Sedimentation triggered by roads reduces the natural storage capacity in a landscape
- Roads and bridges impede drainage and create water logging, affecting the capacity to absorb high rainfall and floods
- Roads and bridges dissect flood plains – creating less ‘space’ for floods, causing breaches in unexpected places, making the floodplain wetter on the river side with less capacity to absorb high water, hence triggering floods
- Bridges are often too narrow and stand in the way causing high water to pound up and create floods and cause sedimentation, reducing the storage capacity of the river bed/ flood plain

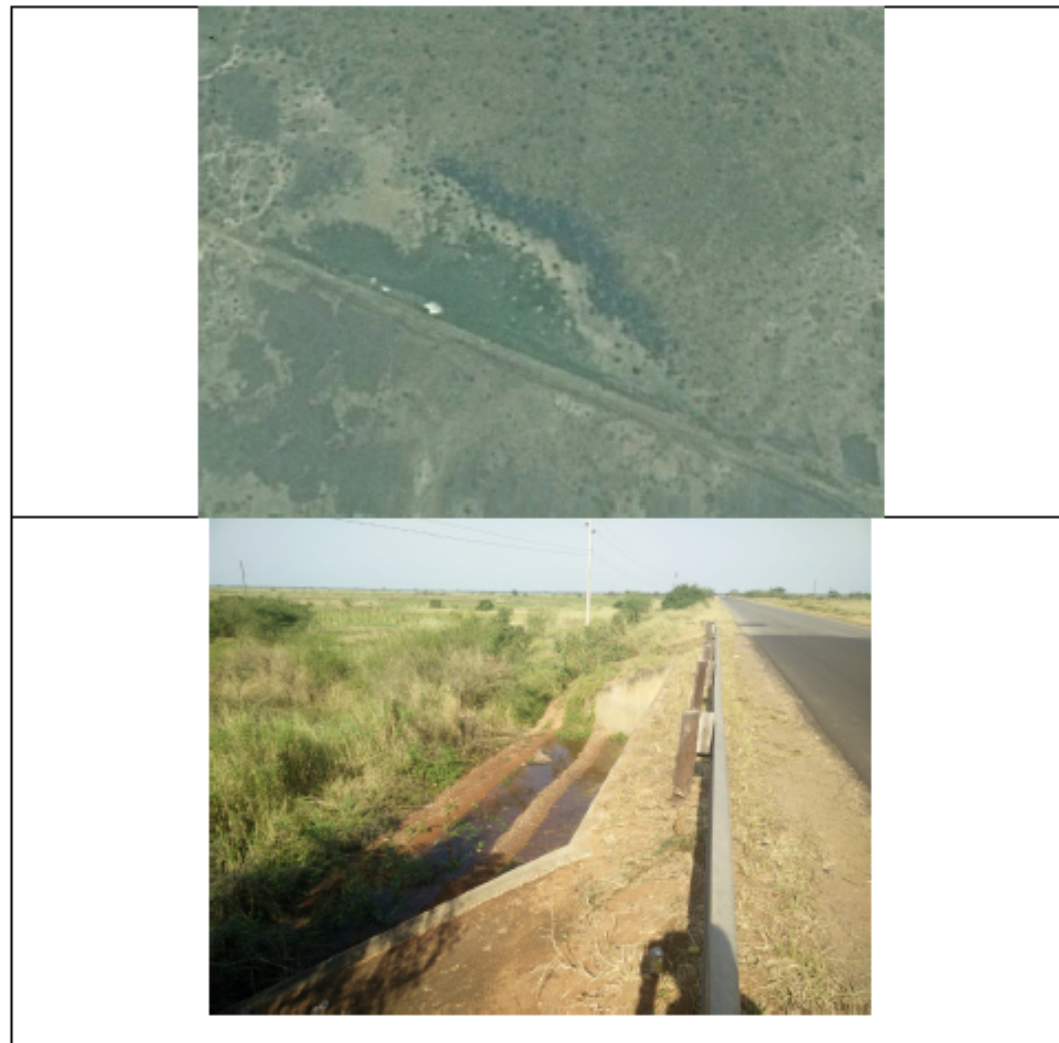
# New flooding regime: run off created in (too) limited number of cross drainage structures



**Roads infrastructure often creates floods**  
**Example new Dushanbe – Kanak road (Tajikistan):**  
**163 avoidable problem spots**



# Roads changing flood plains – dividing them in wet and dry areas; confining them



# Bridge obstructing flow/ flood regime



# Bridge sills impeding drainage, causing water logging





# This should be avoided – be careful with

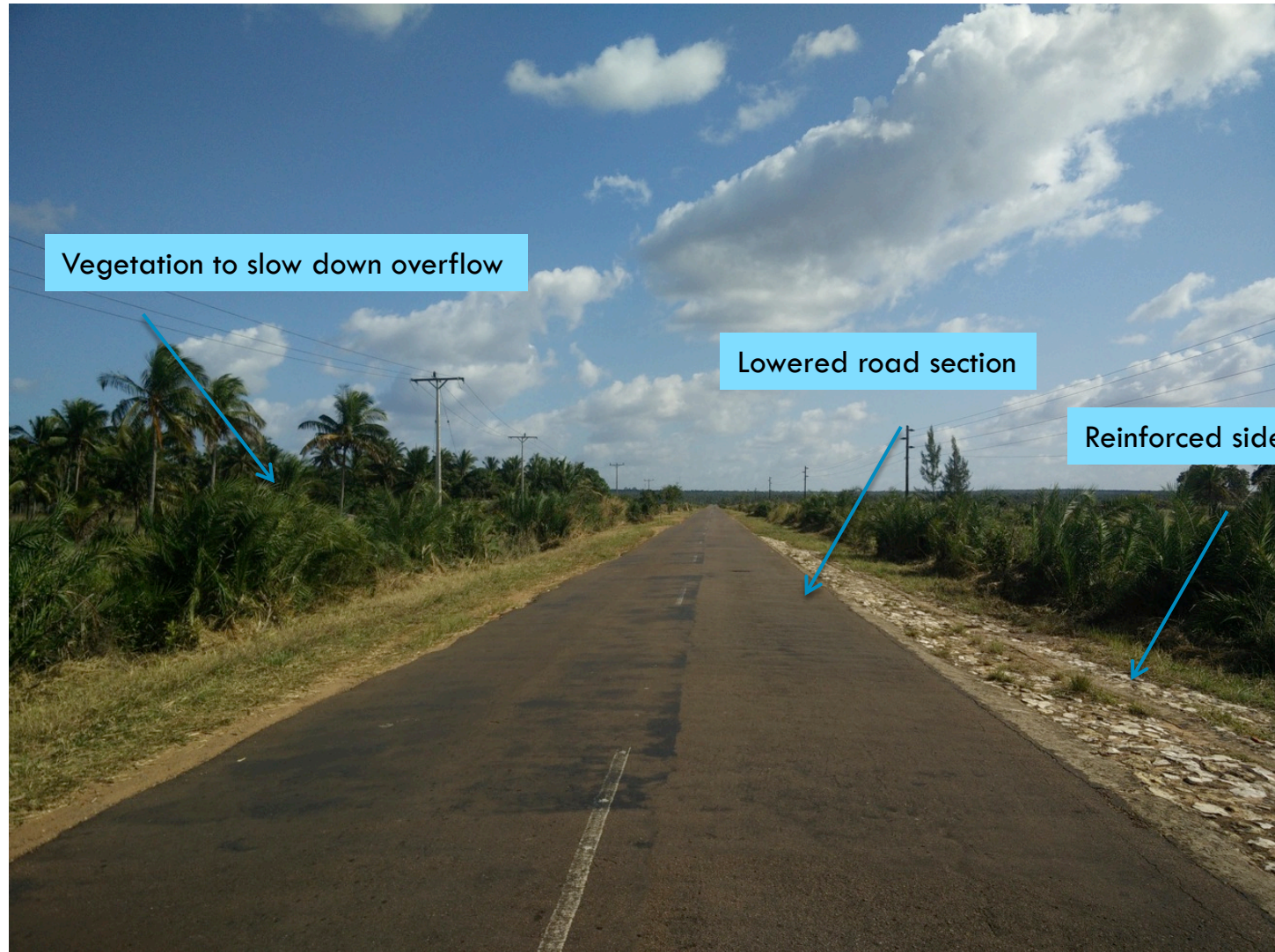
## **General:**

- Solid basic road drainage design (now often afterthought) – taking into account climate change
- Harmonisation of standards and guidelines and working procedures between roads and water agencies

## **Specific:**

- Well-spaced crossdrainage – avoid overconcentration of run-off
- Do not narrow and confine flood plains unknowingly
  - different approach to planning and technical design – vision on floodplain
  - win-win technical designs solutions, such low embankment roads with floodways and flood gates
- Make bridge designs suitable for high flood passage
- Take an integrated landscape approach

# LOW EMBANKMENT ROAD – SAVING COSTS, PRESERVING WETLAND AND NO UNCONTROLLED FLOODS



Vegetation to slow down overflow

Lowered road section

Reinforced side slope



# Flood doors on roads



## 2. Improve roads for flood protection



In flood prone coastal and riverine areas roads and embankments are often combined in one


But often the road and flood protection functions are not coordinated and not aligned – and undermine each other









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- Take long term projection accounting for climate change effects
  - Align width and height of flood embankment and slopes with road sector in dual function
  - Adequate road surface carpetting and protection of slopes
  - Create flood storage with road alignment ('space for the river')
  - New approaches:
    - land accretion
    - creating storage and levees
    - combatting risk of rodent damage

# Creating storage in the coastal plain



# Road causing land rise in lowlying areas



# Space for the river



# 3. Use roads for flood emergency

Roads are evacuation routes

Roads are safe shelters for humans and livestock during floods







# Alternative to flood/ typhoon shelters?





# Design



Roads part of plans for evacuation and safe shelters (for humans and livestock)

- Design capacity accordingly in high risk area
- Road railings visible during floods

Safe (high) roads in low lying flood prone densely populated areas

Reinforced road levees at vulnerable places



TAMAULIPAS

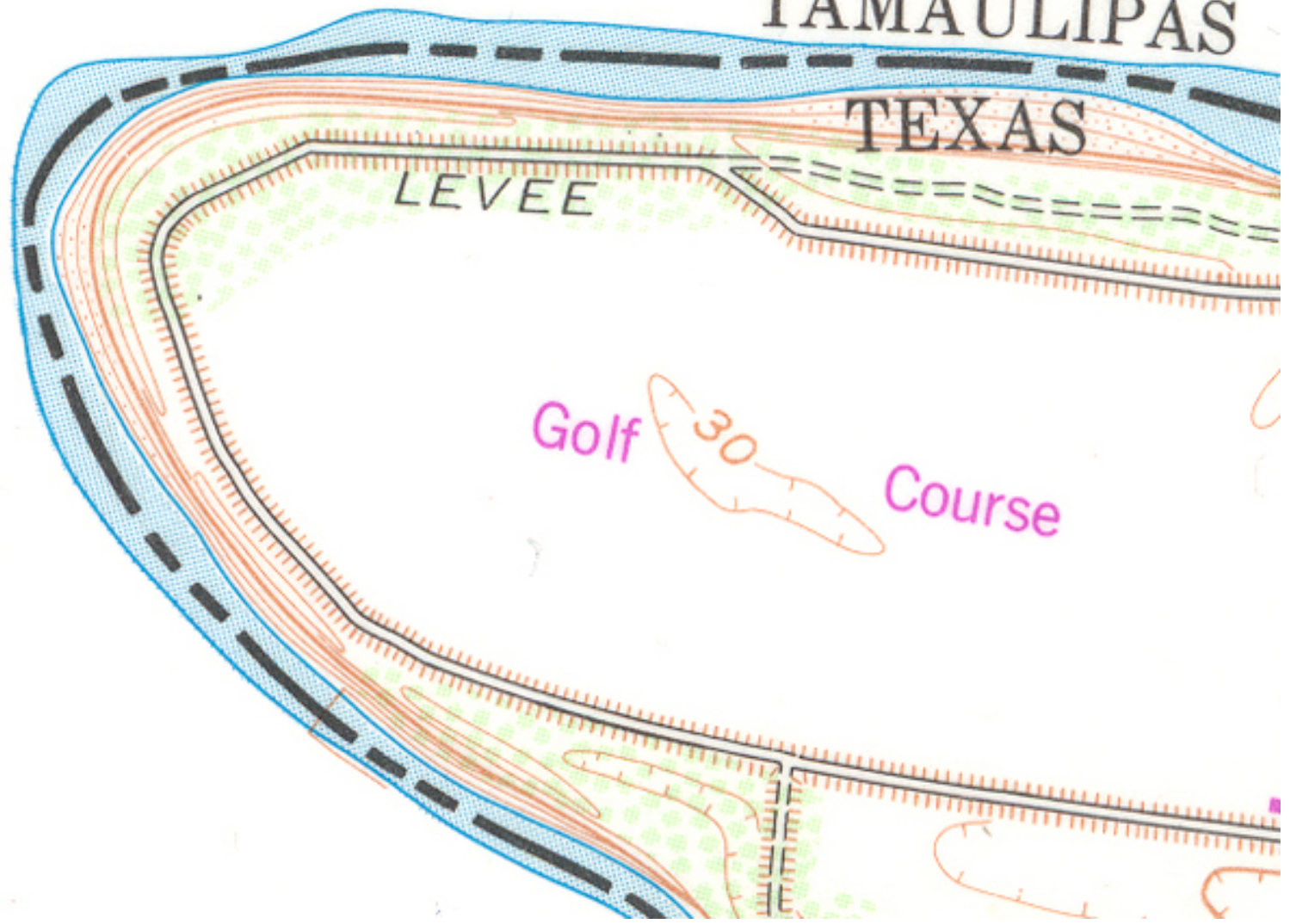
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LEVEE

Golf

30

Course



# 4. Roads in post emergency situations



## Public space to rebuild lives

- Create space with reinforced levees
- Regulate the temporary use of road infrastructure – to avoid exploitation and insecurity





# Learning alliance



31

1. Work with water/road/urban/ agriculture programs



2. Work on optimized practices

- Pilot projects
- Upscaling programs
- Guidelines and designs



3. Capacity building

- Short courses
- Guided learning
- Tools and research

4. [www.roadsforwater.org](http://www.roadsforwater.org)

