

Road Water Management for Resilience in Mozambique



Water can be an important cause of damage to roads whereas in turn roads are a major cause for local flooding, waterlogging and erosion. These problems can be easily turned around into a solution. Roads can route water to storage ponds or recharge areas which help to retain water in dry riverbeds, and ensure systematic spreading of floodwater. Roads can become instruments for climate change resilience and water management.

Bringing together road, water, agriculture and DRR practitioners, local governments and roadside communities several technologies can be implemented having the following benefits:

- Climate resilience will significantly improve
- There will be considerably less damage and less downtime to roads
- Water from the roads can be used for productive uses
- There will be less flooding and erosion damage to the area around the roads





Considering low embankment roads in flood plains

- ✓ Having low embankment roads with lowered overflow section should be considered, especially when flooding is for a limited period or occasional
- ✓ Low embankment roads conserve floodplain functions, reduce road-building costs and avoid unpredictable damages around the road
- ✓ The lowered overflow section should be armoured with stone pitching. Trees on either side will provide further protection against scour of the overflowing water
- ! Do not make the overflow section too narrow: it has to accommodate substantial quantities of water

Using road crossings (drifts) to store ground-water upstream

- ✓ Road crossings without culverts will help to store water upstream in the river bed which will recharge wells
- ✓ If the river is sandy this can store a good quantity of water
- ✓ If the river is broad a drift combined as sand dam without culverts will stabilize the river bed
- ✓ If the road crossing is connected to the bed rock it will act as full sand dam
- ! Make sure the road crossing is wide enough and lowered in the middle to make the flood water pass

Roadside tree planting for environmental mitigation and economic benefit

- ✓ Support local by-laws and planting of economically rewarding trees
- ✓ Select appropriate species together with communities and local experts
- ✓ Involve roadside communities in planting and maintenance
- ! Avoid tree planting along curves and road stretches with reduced visibility



Flood water spreaders from road surface to enhance soil moisture and recharge groundwater

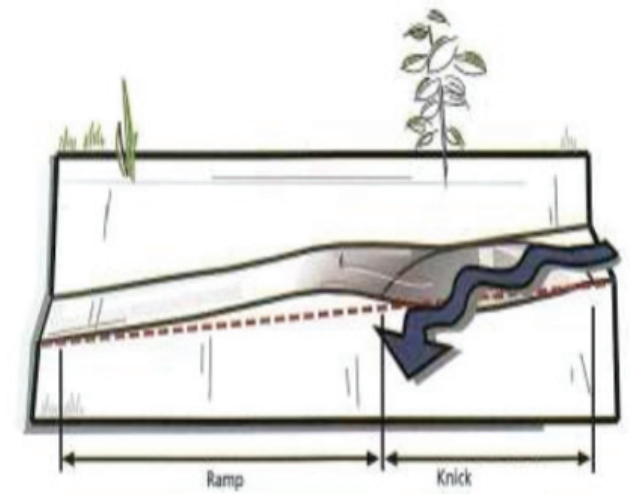
- ✓ Make in direction of slope
- ✓ Make at regular distance especially when the road is slopy
- ✓ Avoid use in steep slopes

Road side farm trenches can remove excess water and improve farm soil moisture

- ✓ Run-off collected on the road surface can be diverted into to farm trenches
- ✓ They can be connected with the road-run off outlets commonly made along roads
- ✓ Should be developed jointly by farmer-land owners and local roads staff
- ✓ To guide the water to the farm trench a water bar may be made across the road
- ✓ In some cases a simple diversion canal may be sufficient
- ! Ensure the amount of water entering the farm trench is not too much: this can be done by closing the trench with soil bund
- ! Ensure trench entrance is in direction of the flow

Water spreaders from culverts for supplemental irrigation

- ✓ Use water to spread gently away from natural drain to avoid erosion
- ✓ Construct these culvert water spreaders early on so that no gully will develop
- ✓ Gently guide the water to agricultural land
- ✓ Reinforce the bund with stones when available



Water storage ponds (incl. borrow pits) to store water from road side drainages and culverts

- ✔ Carefully consider location of the pond/ borrow pit - close to users and able to be filled easily
- ✔ Make sure the pond is managed and protected
- ✔ Include sediment trap and plant vegetation along water flow
- ✔ Lining with clay, geomembrane, or other techniques to avoid excessive seepage
- ✔ If unlined, the pond serve groundwater recharge
- ❗ Do not place too close to road body to avoid road damage

Roadside infiltration trenches or ponds for groundwater recharge

- ✔ Guide road drainage water to infiltration trenches or ponds to recharge groundwater
- ✔ Make spill overs between segments of the infiltration trenches
- ✔ Remove silt regularly
- ❗ Avoid infiltration pond too near to the road – may undermine the road and may create road safety problem

Rolling dips on unpaved roads to avoid flooding of road

- ✔ Make small water bars on unpaved roads at regular distance – this avoids road erosion and helps to harvest water from the roads
- ✔ If the road is steep make these rolling dips at shorter distance
- ✔ Make rolling dips at angle with roads to guide the water away from the road
- ✔ Divert the water to land or grazing area
- ✔ Depending on the softness of the road material consider water bar from concrete or from road material itself
- ❗ Avoid flooding of adjacent land