

# Road Water Management for Resilience in Tajikistan



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 into 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





Select the road alignment that will be safe from higher risks of flooding, land slides and erosion due to climate change

- ✔ A forward looking hydrological analysis including expected climate change effects is essential to plan safe and reliable road alignments
- ✔ This will inform the height and route of the road, the river protection measures, use of galleries and tunnels and the landscape measures around the road
- ✔ The road alignment can also be chosen so to minimize erosion and optimize the opportunities for beneficial water management
- ✔ In some areas the road body when well protected can also be used as the side of a water storage reservoir

Using irish crossings (drifts) to retain water and stabilize river beds

- ✔ Reinforced river crossings on mountain streams will stabilize the river bed
- ✔ By making slightly lower section in the middle (melt) water can cross easily
- ⚠ A downstream apron may be considered if the river bed is not armored

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



Ensure well designed road drainage as part of the road development

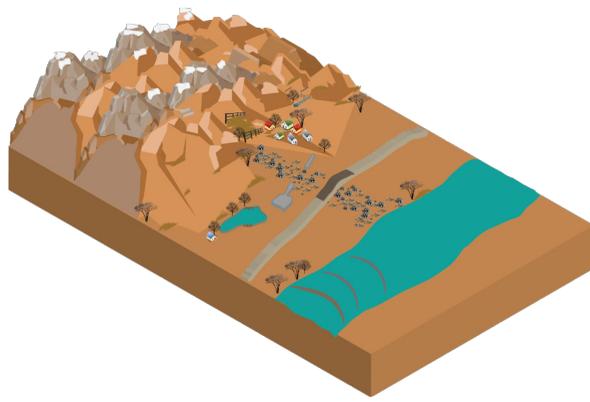
- ✓ Adequate size of culverts and drains  
Adequate founding of bridges
- ✓ Safe downslope disposal
- ✓ Consider beneficial use of road guided drainage water

Guiding road drainage to productive land

- ✓ Rather than leading road drainage water down road side slopes (red arrow), it should be guided to land where it can be used productively (blue arrow)
- ✓ This is particularly useful in areas with low and medium rainfall and high temperature
- ✓ This can be either agricultural land or grazing land where the water is spread
- ✓ This needs new different routes and discharge points for the road side drains

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 serves groundwater recharge
- ! Do not place too close to road body to avoid road damage



### Creating a stable and productive environment around the road bodies

- ✔ If the area around the road is well kept and able to retain water and reduce erosion it will become a productive asset and it will reduce damage to and by the road
- ✔ In mountain areas land and water around the road will benefit from land use planning, greening, new safe land development, control of mountain springs, use of terraces, soil and water retention ponds, optimum use of mountain stream and trials with artificial glaciers
- ✔ In lowland areas terracing, water harvesting, bio-engineering, use of low water consumption crops are important interventions

### Bio-engineering for slope, soil and road protection and productive use

- ✔ Use a range of planting techniques (contour wattling, brush layering, turfing) to plant on steep road-side slopes
- ✔ Combine some species that are good for livelihoods (e.g. fodder species) with species that are especially good for bio-engineering and have deep roots
- ✔ Early plantation maintenance to keep weeds from competing with plants  
Spacing of plants is usually 10 cm for grass type species and may go to 20 - 30 cm for hedge type species
- ✔ For grass plantations, spacing of the line increases as slope increase

### Roadside tree planting for environmental improvement, dust control and economic benefit

- ✔ Planting lines of trees and shrubs of different heights will reduce dust from roads
- ✔ Select appropriate species together with communities and local experts  
Involve roadside communities in planting and maintenance
- ✔ Protect young trees from animals for instance with thorny branches and ensure they are well watered in early growth stage
- ❗ Avoid tree planting along curves and road stretches with reduced visibility