ASIA AND THE PACIFIC TRANSPORT FORUM 2024
CLEAN TRANSPORT FOR ALL
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ASSESSING THE SCOPE FOR GREEN ROADS

Dangara-Guliston Road in Tajikistan

- Internal transportation needs are currently mainly served by a **26,759-km-long road network**, consisting of Public and Departmental roads under responsibility;
- The existing Dangara-Guliston road falls into technical category III.
- The project road consists of one carriageway with two traffic lanes width of 3.50 m, in each lane
- Traffic volumes indicates that the existing road category is not adequate for the anticipated future traffic volumes and improvement/upgrading into four traffic lanes of the road category I was therefore designed
- The road section build important transport links, supply of agricultural commodities
- Part of the A370: significant transport connection through the People's Republic of China, Afghanistan and further south to Pakistan.

BACKGROUND OF ROAD NETWORK IN TAJIKISTAN

GREEN ROADS WILL HAVE A TRANSFORMATIVE IMPACT IN TAJIKISTAN

- NOT JUST ON CONNECTIVITY -

The road sector is a major factor in carbon emissions

***18%** of global CO2 emissions*

Road's change landscape hydrology

*reduction in springs, exacerbating floods, **12-36%** of sedimentation*

Road's change local climates

wind, temperature, moisture, rainfall/dust

Road's affect biodiversity

***second cause** of wildlife kills, disconnected habitats*

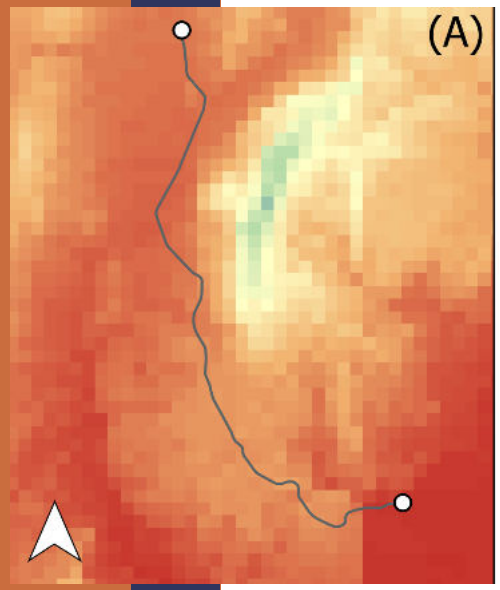
Roads have an important effect on public health

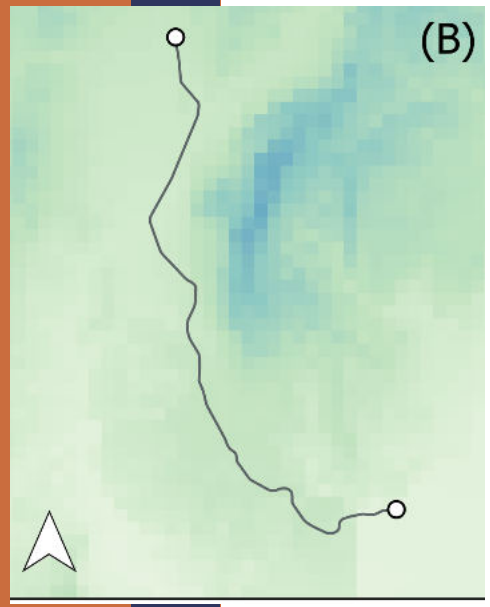
dust, heat, public hygiene

Roads are responsible for the extraction of *30-40%* of all construction materials

WE CAN TURN ROADS INTO NATURE-POSITIVE FOR EXAMPLE IN WATER MANAGEMENT, LOCAL CLIMATE AND BIODIVERSITY, PUBLIC HEALTH AND MITIGATE THE NEGATIVE IMPACTS!

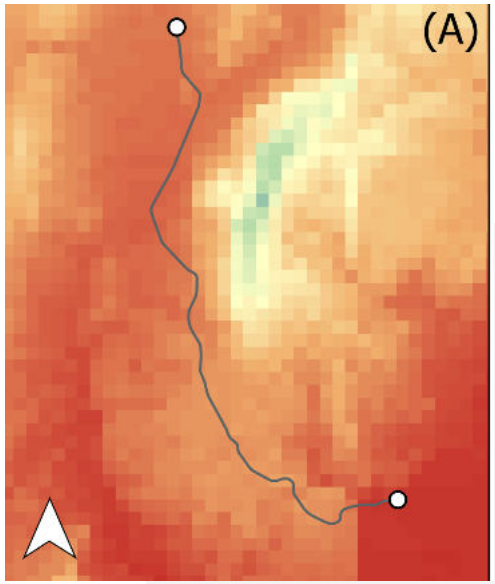
AFFECTS BY THE IMPACTS OF CLIMATE CHANGE IN TAJIKISTAN

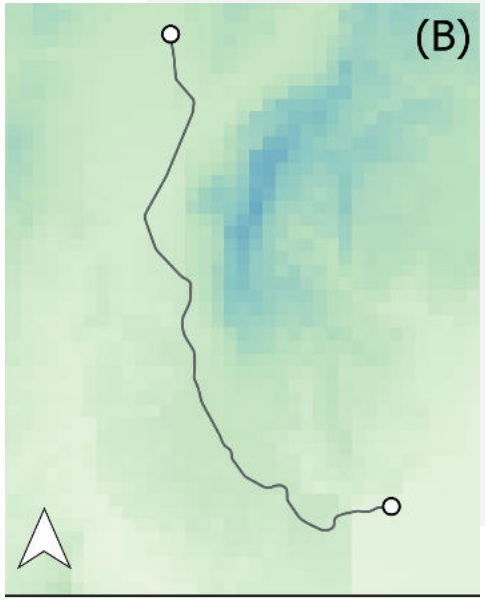




- ⇨ **Higher average and extreme temperatures (1.5-2 °C for 2050; +6 °C by 2100) (see A)**
- ⇨ **Changes in c patterns (see B)**
- ⇨ **Extreme meteorological events, are expected to lead to:**
  - ***water scarcity***
  - ***droughts***
  - ***decreased agricultural yield***
  - ***increased slope instability, and more deleterious impacts***

DANGARA - GULISTON ROAD IS IN GENERAL VULNERABLE TO CLIMATE RISKS





CLIMATIC CHANGE	IMPACT
Warming above the global mean in central Asia	• Increase in average plain region temperatures of 0.5 to 0.8 C and mountain region temperatures of 0.3 to 0.5 C in 60-year period • Increase in ice melt and snow melt triggering floods and mudslides. • Melting of permafrost increasing landslides • Shift from dry snow to wet snow
The number of days over 40°C has increased A)	• More evaporation, higher water demand, more aridity
Increase in evapotranspiration	• Estimated increased evaporation by 5-14 percent and vapor transpiration by 10-20 percent.
Reduction in snow and ice field and declining glaciers	• Lower amount of water in streams, springs and seasonal streams drier earlier, droughts
Increasing frequency and intensity of extreme events particularly, intense rainfall; decrease in number of rainy days (B)	• Heavy rains, high waters caused by mudflow, high air temperature accompanied by droughts, strong winds and dust storms, frost and extreme cold temperature; larger risk of landslides
The winters are becoming warmer (temperature is expected to increase by 2 degrees), and the duration of frost-free days has increased	• Spread of pests

WHAT ARE GREEN ROADS?

- COMPARING REGULAR ROADS AND GREEN ROADS -

12 Themes

3 for Regular Roads

- ⇨ Connectivity and access
- ⇨ Safeguarding safety
- ⇨ Making affordable transport possible

9 for Green Roads

- ⇨ Decarbonization
- ⇨ Climate resilience
- ⇨ Water and land management
- ⇨ Reducing pollution
- ⇨ Improving quality of life
- ⇨ Preserving biodiversity
- ⇨ Disaster preparedness
- ⇨ Sourcing materials sustainably
- ⇨ Fostering inclusive growth

Synergies between the themes!

1. Decarbonization

18 % of global CO2 emissions (IEA, 2021).

- ✓ **Emissions in each phase of the road cycle (material production and transport, construction, use, maintenance and end-of-life)**

Key intervention areas:

1.1 - REUSE OF EXISTING ROAD MATERIAL

Actions and implications:

- **Assessment and calculation of material in current road**
- **Separation and reuse plan**
- **Timing and reuse in the tender documents**

1. Decarbonization

18 % of global CO2 emissions (IEA, 2021).

- ✓ **Emissions in each phase of the road cycle (material production and transport, construction, use, maintenance and end-of-life)**

Key intervention areas:

1.2 - LED LIGHTING

Actions and implications:

- **Calculation of the energy consumption for each traffic light and choose LED lighting**
- **Assessing the potential for constructing renewable energy infrastructure along road**
- **Evaluation of potential for implementing luminous road markings, beacons, and traffic signage.**

1. Decarbonization

18 % of global CO2 emissions (IEA, 2021).

- ✓ **Emissions in each phase of the road cycle (material production and transport, construction, use, maintenance and end-of-life)**

Key intervention areas:

1.3 - ROADSIDE TREE PLANTING

Actions and implications:

- **Tree planting plan with selection of species (trees and undergrowth), seedling sourcing, planting system, ownership, community engagement, maintenance system, business and replacement system.**

2. Climate Resilience

- ✓ **Climate-related damage to road infrastructure costs countries between 1-3% of their GDP annually (World Bank)**
- ✓ **Making infrastructure more climate-resilient can add about 3 percent to the upfront costs but has benefit-cost ratios of about 4:1 (Global Commission on Adaptation)**

Key intervention areas:

2.1 – BIO-ENGINEERING SECTIONS IN CRITICAL SECTIONS

Actions and implications:

- **Bio-engineering plan covering the highly exposed riverbanks and the unstable slopes at the end of the road and the possible affected road slopes in the new road section.**

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Key intervention areas:

2.2 – RETHINKING ROAD DRAINAGE IN CRITICAL SECTIONS

Actions and implications:

- **Assessment of drainage system in current inlets and outlets**
- **Investigation for adding culverts.**
- **-Red of adequate outlet / chute for the drainage system**

3. Water and Land Management

- ✓ **Water is responsible for 80% of road damage to unpaved roads and 30% of damage to paved roads**
- ✓ **It is estimated that 20% of the global land surface is within one kilometre of road**
- ✓ **Roads have a major impact on local hydrology – often with negative consequences – this can be turned around into beneficial water management using the road infrastructure**

Key intervention areas:

3.1 - MUDFLOW CONTROL FROM THE TOP

Actions and implications:

- **Measurement and mapping of the gullies**
- **Design and cost of diversion structure**
- **Gully plugging program**

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Key intervention areas:

3.2 - WATER REUSE OPTIONS

Actions and implications:

- **Water collection measures will be added later at the end of the cross-drainage system**

4. Reducing Pollution

- ✓ **Usually, a land strip up to 60-100 meters from the road is significantly affected by road pollution, either from runoff or deposited road dust.**
- ✓ **The health consequences of exposure to these contaminants can be severe**

Key intervention areas:

4.1 – SAFE DECOMMISSIONING AND REMOVAL OF PETROL STATIONS

Actions and implications:

- **Mapping and assess ownership status of abandoned petrol stations**
- **Soil sampling to assess degree of contamination of all petrol stations.**
- **Safe removal and treatment plan**

4. Reducing Pollution

- ✓ **Usually, a land strip up to 60-100 meters from the road is significantly affected by road pollution, either from runoff or deposited road dust.**
- ✓ **The health consequences of exposure to these contaminants can be severe**

Key intervention areas:

4.2 –RETHINK DE-ICING STRATEGY

Actions and implications:

- **Stakeholder engagement in de-icing**
- **Updating of current methods and bottlenecks.**
- **Improvement of strategy:**
  - ***De-icing material***
  - ***Better planning***

4. Reducing Pollution

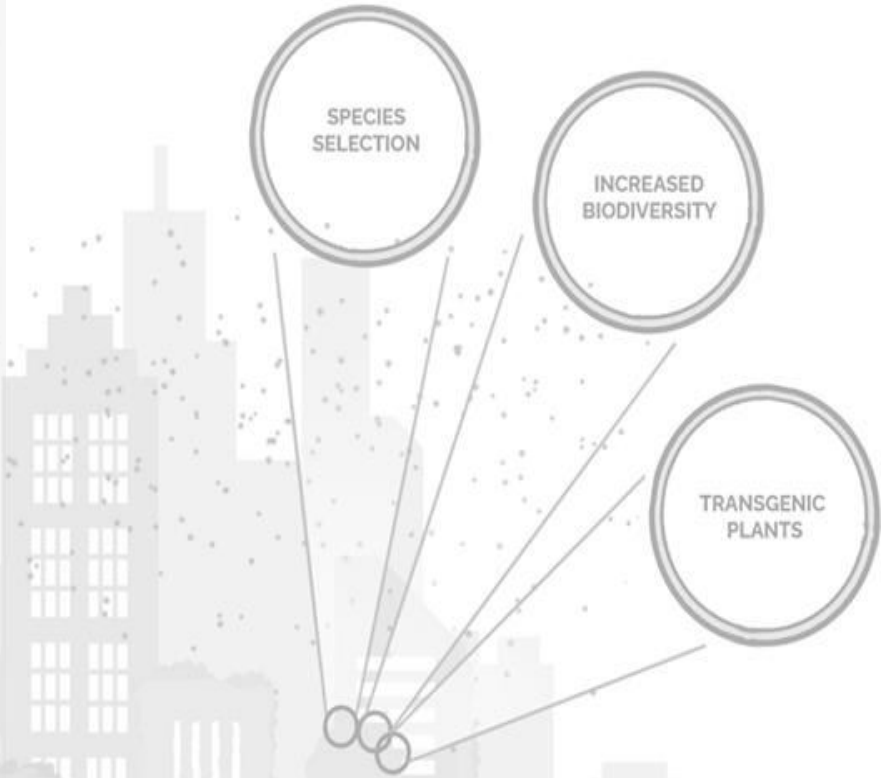
- ✓ Usually, a land strip up to 60-100 meters from the road is significantly affected by road pollution, either from runoff or deposited road dust.
- ✓ The health consequences of exposure to these contaminants can be severe

Key intervention areas:

4.3 – BIO-ACCUMULATOR PLANTS IN ROADSIDE VEGETATION

Actions and implications:

- Bio-accumulator plants that absorb roadsides that are contaminated with hydrocarbons and break down these contaminants



PARTICULAR MATTER IN CITIES - TYPES, ORIGINS, AND RISKS

PLANTS AS BIOFILTERS

PM REDUCTION BY GREEN INFRASTRUCTURE: GREEN ROOFS, LIVING WALLS, WATER RESERVOIRS, URBAN FARMING

METHODS OF INCREASING THE PM CAPTURE POTENTIAL OF PLANTS

5. Quality of Life

- ✓ Large negative impacts from roads to people's quality of life, via dust, noise, temperature and aesthetics. This can be reduced and turned around.
- ✓ Tree planting is found to be associated with significant reductions in non-accidental and cardiovascular mortality (Donovan et al., 2022)
- ✓ Use of temperature control technologies such as the use of Thermosyphon can help to minimize permafrost thawing and heat island impact of road pavements
- ✓ Closely aligned to all other Green Roads themes.

Key intervention areas:

5 - BLOSSOM ROAD IN ROADSIDE TREE PLANTING

Actions and implications:

- **Roadside vegetation have a marked contributions to the quality of life**
- **Improvement of air quality and dust control via roadside vegetation**

6. Preserving Biodiversity

- ✓ **Roads significantly influence biodiversity, impacting both ecosystems and habitats, as well as populations of invertebrates (such as insects and soil biota) and vertebrates (including protected species).**
- ✓ **To address the biodiversity crisis, it is critical to ensure roads no longer harm biodiversity but instead preserve it and that habitats stay connected**

Key intervention areas:

6 – ADDITIONAL LIVESTOCK PASSAGES

Actions and implications:

- **Discussion with pastoralists to assess the priorities for livestock passages in combination with existing culvers**
- **Reinvestigation in the presence of special biodiversity**

9. Fostering Inclusive Growth

- ✓ Roads wire economies – yet still over 400 million of Asia's population lacks basic road access
- ✓ Road construction and maintenance is a large public expenditure ticket – high scope for inclusive growth and jump-start fledgling economies
- ✓ In many countries, road construction is also included in social safety net programs
- ✓ Road construction can be used to build entrepreneurial capacity and – through local sourcing - to enlarge the money circulating in local economies

Key intervention areas:

9 – LOCAL SOURCING PLAN TO OPTIMIZE ENGAGEMENT OF LOCAL CAPABILITIES

Actions and implications:

- Development of standard local sourcing (LSP) that will be include as a provision in the tender document,
- Agreement of scoring and weightage for the LSP in the tender procedure
- Enforcing the LSP based on reporting and securities.

Suggestions are made for Type B activities that may be added to the road investment

Introducing bioengineering and roadside tree-planting	• **program of developing and introducing right methods, combined with capacity building**
Network analysis to look at planning and upgrading of entire network	• Assessment of entire network and identify easy entry methods to introduce climate resilient practice
Preparing Guideline and Instruction on Green Roads	• Introduction of a Guidelines combined with specific binding instructions could be considered
De-icing practice	• Review and update current De-icing practice

THANK YOU!