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Green Roads for Water Initiative


Can we think of roads beyond transport?
Can we make roads instruments for resilience, better water management, regreening – i.e. not just adjusting but using pro-actively?
YES
We can
&
We should

At present, **REALITY** is different...

Erosion and sedimentation

Local flooding

Roads are a major cause of:

Water logging
(crop loss and health problems)

Dust
(Health problems and crop loss)

Roads have a major imprint on hydrology, acting as a barrier or drain

What Are Green Roads for Water?

- Roads that have secure transport functions
- Roads that are instruments for water management
- Road that are used for flood protection
- Roads that stem erosion and promote good land management
- Roads side vegetation that controls dust and filters effluents

Case Load

Why Green Roads:
Big Scale and Big Impact

Roads are major investment globally
(1-2 Tr USD/year)

Asia: investment required in infrastructure 1.3 -1.7 Tr USD/ year
Cost of climate proofing transport infrastructure USD 37 Bn

Roads are one of the major impacts on (surface and subsurface) hydrology and flood patterns and air quality

At same water causes 35-80% of road damage

Impact now often negative: turn around 'green roads' as instruments for (climate) resilience, beneficial water management and dust control

Case Load

Why Green Roads:
Big Scale and Big Impact

Many tested Green Roads measures exist, suited to different geographies

Green Roads can be a main instrument for climate resilience, health and increased agricultural production

Measures are low cost in comparison to total road investment (<5%) – and often saving cost of investment and maintenance

Rate of return high (>4 in a year)

Many things can be done

Safeguarding wetland functions with low embankment road

Roads as flood embankment with gated underpassage

Feeding soil moisture with road drainage

Drift = sand dam and river bed stabilizer

Labour intensive mass balance method Nepal – far less erosion

Water from spring opened by road construction

Re-using road material for recharge structtures

Road side tree plantatiosl

Recharge with swales

Borrow pits converted to recharge ‘water factory’

Road side pond

Roads created from storage excavation

Roads leading to flood shelters, roads serving as (post) flood shelters as well

Roads controlling water tables between high and low land

Gated culverts for water management

WORLD BANK GROUP

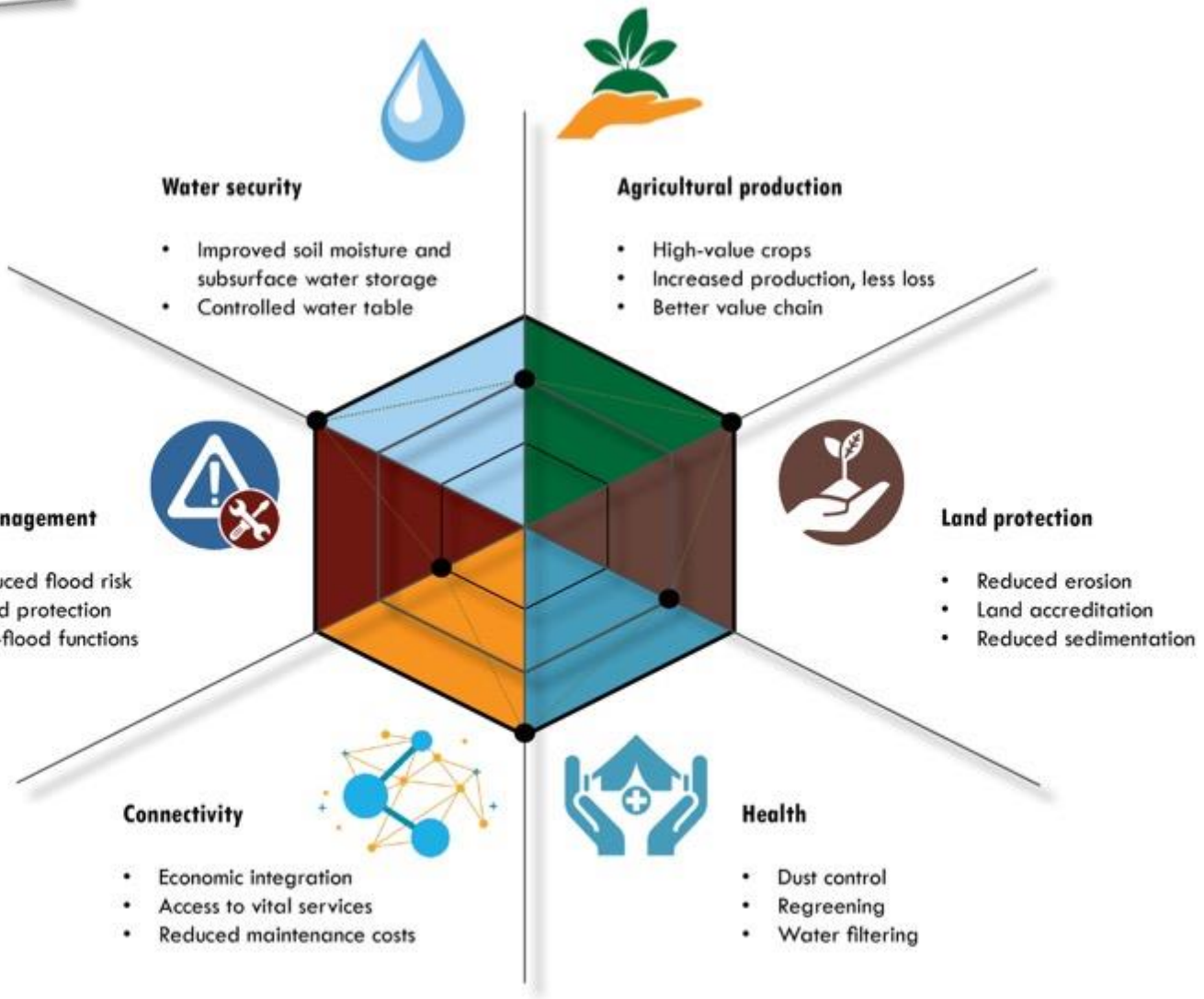
GUIDELINE:
GREEN ROADS FOR WATER

INTEGRATING WATER MANAGEMENT AND CLIMATE-CHANGE ADAPTATION
IN THE DESIGN AND CONSTRUCTION OF ROADS

- Approach
- Geographies
  - semi arid areas, mountains, low plains, watersheds, …
- Techniques
  - Road embankments, drifts, rural roads, borrow pits/ ponds, road side tree planting, …
- Governance
- Economics
- Technical Annexes

Green Roads for Water:

what matters is co-benefits such as:



Return tend to be high and additional costs low

- Ethiopia water harvesting from roads
  - Investment (incl capacity building): USD 3600/ha,
  - Returns/year USD 16879/ha
    - Reduced maintenance and down time; reduced land damage; benefits of water retained
  - Independently verified
- Bangladesh
  - Reduced water logging and better water level control (benefitting area 1680 ha)
  - Polder 26 – investment USD 200,000
  - Returns/year USD 3.1 M
- No / modest additional investment costs – at times even cost savings (low embankment roads, non vented drifts)

The Green Roads for Water Initiative:

Who are the core? (to ne confirmed)

What are the ambitions?

- To promote Green Roads: to have roads for systematically used for water management, regreening and climate resilience throughout World Bank Operations and introduce as standard in at least 50% of countries in Asia/Africa by 2025
- To work with other organizations to adopt and support the same practices
- To fast track climate change adaptation by retooling roads for water and regreening and at the same time have more reliable transport connections

Green Roads Initiative

What will be done?

1. Mobilizing Green Finance
   - Green/ Climate Bonds for Roads
   - Additionality Funding (GCF, GEF)
   - Private Sector Funding (Land value capture)
2. Community of Practice – Learning Alliance
   - Guidelines reflecting living practice
   - Training and advocacy material
3. On the Ground Support to Projects and Countries
   - Engineering, governance

- World Bank Global Guidelines (QER successful)
- In Asia activities started in Bangladesh, Nepal, Tajikistan – interest from other countries
- Interest outside Asia: Bolivia, Ethiopia, Kenya, Mozambique, Uganda, Yemen, Zambia

What went before

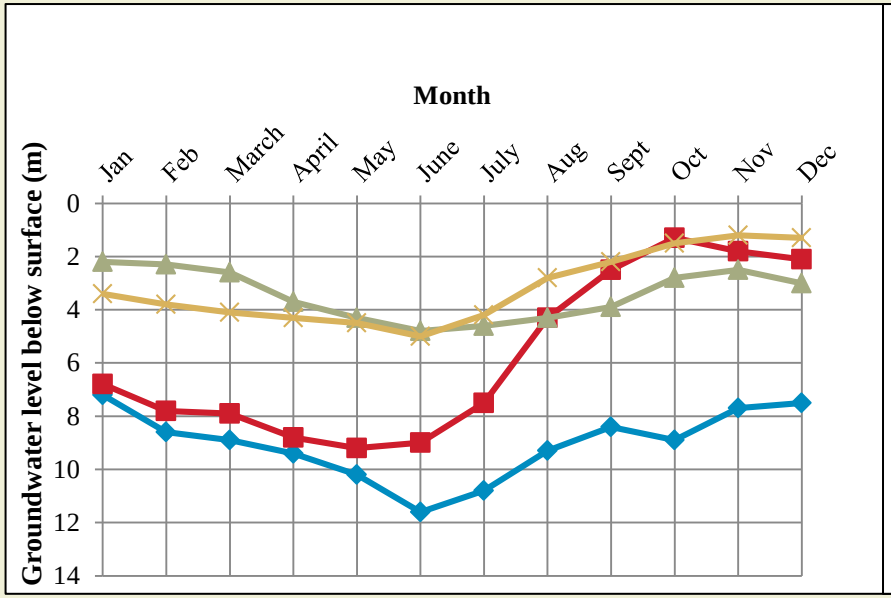
- Road for Water Programme
  - www.roadsforwater.org
  - Global Road Achievement Award 2015
  - Runner Up Resilience Award 2018
  - Since 2015
  - Outreach > 6 M people

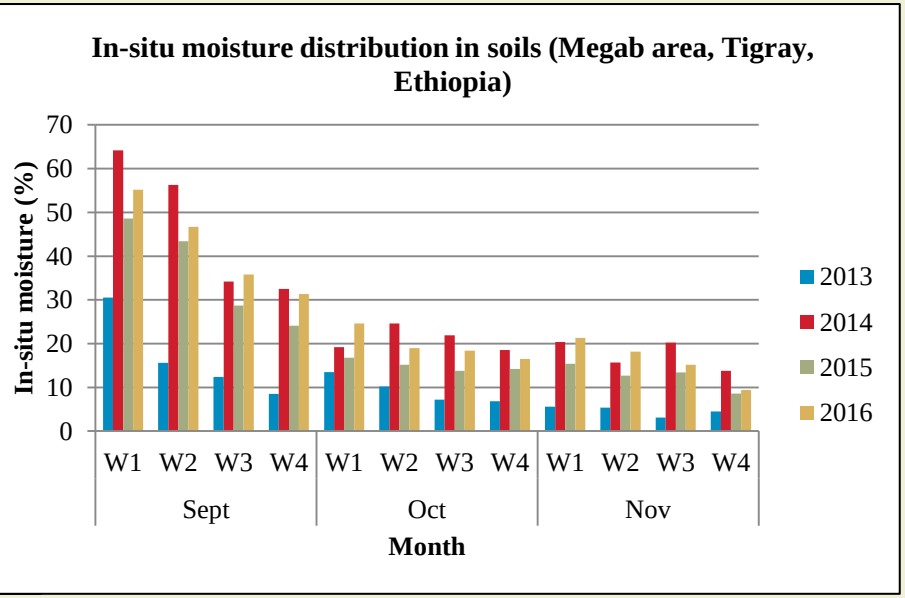
What went before


Road Water harvesting campaigns
> 3 Million people benefitted since 2015

Impacts

Effects on soil moisture from road spreader





Link resilience certification of road projects to finance

(World Bank Global Guidelines)

Road Resilience Class	
Protective	Roads can withstand climate change effects
Adaptive	Road environment modified beneficially contribute to climate resilience
Pro-active	Road bodies and alignments modified to optimally contribute to climate resilience

Level of Road Resilience	0	1	2
	Basic Resilience: Protective	**Resilience Plus 1: Adaptive**	**Resilience Plus 2: Pro-active**
Key words	**Protecting road infrastructure**	**Make best use of and adapt to changed hydrology**	**Redesign road infrastructure to optimize water management/climate resilience of the area**
Bridges	Increased dimensions to accommodate flood peaks and prevent flood congestions; deepen abutments	Integrate bridge crossing in catchment management to reduce riverbed siltation and mitigate flood peaks	Use bridge sills for controlled drainage and wetland management; consider drifts instead of bridges to stabilize riverbeds
Drifts	Higher spillways and larger apron to accommodate peak floods	Use drifts and small fords to stabilize erosive streams	Using non-culvert drifts for water retention, river stabilization, and flood water spreading
Paved roads	Increase capacity of road drainage; reinforce drainage infrastructure; more weatherproof road surfaces, impermeable pavements and embankments	Catchment management to retain water and control erosive runoff to reduce risk to infrastructure	Consider changed alignment and cross drainage for water storage and recharge
Unpaved roads	Increase cross drainage and protect road surface with additional layers of aggregrate	Catchment management (see above); Protect road surface with water bars, dips and infiltration bunds	Include basic drainage for water harvesting as part of road development; measures to manage subsurface flows; catchment protection
Roadside slopes	Strengthen critical slopes		
Drainage structures	Increase dimensions to accommodate larger flood peaks	Gated control and water spreading from culverts and drains	Place culverts to optimize drainage pattern for water harvesting
Borrow pits		Systematically convert borrow pits for storage, seepage or recharge	Plan new borrow pits to optimize storage functions after conversion
Roadside vegetation		Systematically promote roadside planting for sequestration and better dust control and microclimate	

Green Roads Initiative

Connecting with (in progress):

National Programs

Green Finance Initiatives

Academia

United Nations

Bilateral & Multilateral Organizations

Private Sector foundations

Contractors

Main NGOs

Be Part of the Green Roads Initiative

Converted borrow pit for water storage