Open Webinar: Green Roads for Water for Resilience and Recovery

April 15, 2020  11:45 am (CET)
Green Roads for Water, are not only means of transport from A to B but can be instruments for improved livelihoods, for water management, climate resilience and recovery.

Les routes vertes pour l'eau ne sont pas seulement des moyens de transport de A à B mais peuvent être des instruments pour améliorer les moyens de subsistance, pour la gestion de l'eau, la résilience climatique et la récupération.

As Estradas Verdes para Água, não são apenas meios de transporte de A para B, mas podem ser instrumentos para melhorar os meios de subsistência, para gestão da água, resiliência climática e recuperação.

الطرق الخضراء للمياه ، ليست فقط وسيلة نقل من أ إلى ب ، ولكنها يمكن أن تكون أدوات لتحسين سبل العيش ، لإدارة المياه ، والمرونة المناخية والانتعاش.
Roads affect the hydrology of entire areas…

- They block and guide water
- They concentrate runoff
- They interfere with subsurface flows
- They change flooding patterns
- They get damaged in this process
Impact of Roads on landscape, surface hydrology and livelihoods

- Erosion and sedimentation
- Local flooding
- Water logging (crop loss and health problems)
- Dust (Health problems and crop loss)

Roads are a major cause of:

- Local flooding
- Water logging (crop loss and health problems)
- Dust (Health problems and crop loss)
- Erosion and sedimentation
Green Roads can be used to harvest road-runoff that previously would cause flood damage and guide it to recharge areas, surface storage places or distributing it over farmland.
What Are the Green Roads for Water?

- **Rods that increase the climate resilience of rural communities**
  - Roads that are instruments for beneficial water management
  - Roads that reduce land degradation and promote good land management
  - Roads that improve the water supply of rural communities
  - Road that are used for flood protection and flood relief
  - Roads that provide employment opportunities to rural communities

- **Rods that have secure transport functions**
  - Roads that connect rural communities to foods, services and markets
Roads are major investment globally (1-2 Tr USD/year)

For instance: It is estimated that 25 million km of paved road-lanes and 335,000 km of rail-track will be added from 2010 to 2050: a 60 percent increase.

At the same time, water causes 35-80% of road damage

For instance: Transect surveys undertaken along roads in upland Ethiopia and Uganda show that in every 10 km of roads there may be 8 to 25 flash points, such as local erosion, flooding, sedimentation, or waterlogging. Negative impact most severe on the most critical rural community connections.
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).
Tested measures: many things can be done

Retaining water with road drifts

Feeding soil moisture with road drainage

Roadside tree planting
Good news: many things can be done

Gardening with roadside wells

Borrow pit converted to water storage

Road embankment creating storage reservoir
Good news: many things can be done

- Harvesting fodder from culvert run-off
- Water from spring opened by road construction
- Safeguarding wetland functions with low embankment road
- Road side recharge structures
Good news: many things can be done

- 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
GUIDELINES:
GREEN ROADS FOR WATER
INTERGRATING WATER MANAGEMENT AND CLIMATE-CHANGE ADAPTATION IN THE DESIGN AND CONSTRUCTION OF ROADS

- Approach
- Geographies
- Techniques
- Governance
- Economics
- Technical
- Annexes

The GL are targeted at road planners and infrastructure investors but also at people working on flood protection, landscape restoration, agricultural development, climate resilience and environment in general.
**Challenges:**
Road run-off causes extensive erosion, flooding and sedimentation but also damage to road bodies.

**Opportunities:**
Use of road for water harvesting at large scale (use of harvested water for irrigation, livestock drinking water and groundwater recharge).

**Techniques:**
Use of flood water spreaders, flow dividers at culverts, road drifts or road embankments to divert the road run-off to water storage. Use infiltration trenches, converted borrow pits or farm ponds as water storage structures.
Green roads for Water in different geographies

Coastal areas

Challenges:
Roads have a major impact on water management which is often manifest in water logging.

Opportunities:
As roads are the main infrastructure in these areas, they can be used to control water levels for productive uses. Such measures contribute also to the longevity of road network. Roads can be also used as flood shelters and evacuation routes.

Techniques:
Use of road alignment to compartmentalize high and lowlands, adequate cross drainage to retain and release water, using gated culverts for water level control, making use of borrow pits for drainage and water storage using roads for land accreditation.
Green roads for Water in different geographies

Mountain areas

Challenges:
The development of roads in these areas can have a heavy negative impact on the surrounding environment and undermine climate resilience. Road development can change runoff patterns and cause areas to further dry out.

Opportunities:
Safeguard the road environment with measures that reduce the risk of disturbance whilst also improving the productive value of these areas.

Techniques:
For the development of new mountain roads, the mass balance method should be considered. Main techniques to manage the water road environment are spring capture, reinforced road water crossings and bio-engineering.
Green Roads for Rural Water supply

Even if road surface can affect the water quality, the very large portion of water harvested with roads, originates from the entire catchment. The harvested water can improve the rural water supply by augmenting the resource though recharge and feeding surface storage.

RWH for groundwater recharge
Use of groundwater for domestic purposes and irrigation

RWH for water storage
Use of harvested water for irrigation and livestock drinking water

Roadside spring management
Use of harvested water for domestic purposes

Roadside spring opened after road construction in Tigray, Ethiopia
To get this process going may entail different steps such as fact finding, getting sectors to talk, identify champions, work on early implementation, work on different fronts, capacity building and research and consolidation in working methods.
<table>
<thead>
<tr>
<th>Level of Road Resilience</th>
<th>0 Basic Resilience: Protective</th>
<th>1 Resilience Plus 1: Adaptive</th>
<th>2 Resilience Plus 2: Proactive</th>
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</thead>
<tbody>
<tr>
<td><strong>Key words</strong></td>
<td>Protecting road infrastructure</td>
<td>Making best use of and adapting to changed hydrology</td>
<td>Redesigning road infrastructure to optimize the area’s water management/climate resilience</td>
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<tr>
<td><strong>Geographies</strong></td>
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<td><strong>Semiarid areas</strong></td>
<td>Catchment measures to reduce water damage to roads</td>
<td>Use runoff guided from roads for recharge and storage; upper catchment protection</td>
<td>Design roads and cross-drainage facilities to collect runoff and guide to recharge area</td>
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<tr>
<td><strong>Watersheds and catchments</strong></td>
<td>Catchment protection to protect road infrastructure</td>
<td>Catchment protection to protect road infrastructure</td>
<td>Plan road alignment and drainage structures in support of catchment management</td>
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<td><strong>Coastal areas and floodplains</strong></td>
<td>Increase height of flood embankments to deal with higher floods</td>
<td>Convert village roads for water-level management with gated structures</td>
<td>Consider low embankment roads with controlled floodways develop road levees in flood-prone areas; use roads for land accreditation</td>
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<td><strong>High- and medium-altitude areas</strong></td>
<td>Have safe road water crossing and protection measures; have adequate road drainage; reconsider road alignment to higher areas; train mountain rivers to reduce exposure of roads to mountain floods</td>
<td>Using water-retention and land-management measures suitable to mountain areas to stabilize mountain catchment and retain moisture and snowmelt; systematic spring management</td>
<td>Use cut and fill instead of cut and throw methods; observe maximum slope and gentle alignments; combine roads with additional storage to and drift for torrent stabilization</td>
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<td><strong>Desert areas</strong></td>
<td>Revegetation and dune stabilization using road runoff</td>
<td>Develop small roadside oases taking road runoff to depression areas</td>
<td>Adjust road directions to deal with wind directions to control sand dune formation</td>
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Monitoring the impact of Green Roads in Ethiopia


(a) In-situ moisture distribution in soils (before and after the construction of structures that divert runoff from culverts into farmlands along the Mekelle road (Kihen), Tigray, Ethiopia. Construction of the diversion structures was done on May-June 2014. Monitoring was done for the period September years 2013 to 2018. (W1= Week one; W2=Week two; W3=Week three and W4=Week four). (b) Rainfall distribution for (ENMSA, 2018).

(a) Groundwater fluctuation in Selekleka area, Tigray, Ethiopia (at downstream of a check-dam which was constructed in the period January is designed to store improved at downstream of the box culvert b) Rainfall distribution for the year 2012 to 2018 (ENMSA, 2018).
Return tend to be high and additional costs low

• **Ethiopia (Tigray)**
  • Investment (incl capacity building): USD 3600/10 km,
  • Returns/year USD 16879/10 km = factor 4 in one year
    • Reduced maintenance and down time; reduced land damage; benefits of water retained
  • Independently verified

• **Bangladesh (polder 26)**
  • Reduced water logging and better water level control (benefitting area 1680 ha)
  • Investment USD 200,000; returns/year USD 3.1 M

• **Kenya** – roadside tree planting return factor 4 to 15

• **No / modest additional investment costs** – at times even cost savings (low embankment roads, non vented drifts)
Green Roads for Water Program

Aim: To have roads for systematically used for water management, regreening and climate resilience and introduce as standard in at least 50% of countries in Asia/Africa by 2025

Supported by: The World Bank, GRP, ADB, IRF, WFP (in discussion)

Development of GR4W Guidelines and Guided Learning packages

Active in more than 10 countries

Outreach current > 6 M people
Connecting with (in progress):

- **National Programs**
- **Green Finance Initiatives**
- **Academia**
- **United Nations**

- **Bilateral & Multilateral Organizations**
- **Private Sector foundations**
- **Contractors**
- **Main NGOs**

- **DFID**
- **IFDC**
- **Ministerie van Buitenlandse Zaken**
- **Global Environment Facility (GEF)**
- **Asian Development Bank (ADB)**
- **Rockefeller Foundation**
- **Volker Wessels**
- **WFP (World Food Programme)**
- **IFAD (International Fund for Agricultural Development)**
- **HELVETAS**
- **INTERNATIONAL FEDERATION**
- **JUSTDIGIN**
- **ZOOG**
What is being done?

1. **Mobilizing Green Finance**
   - Connect climate finance with road infrastructure
   - Develop underlying numericals for additional costs and multiple benefits – co-benefits
   - Prepare packages for funding
   - Explore Green Bonds for verified Green Road programs
   - Co-benefits methodology

2. **Community of Practice – Learning Alliance**
   - Learning Alliance (building on [www.roadsforwater.org](http://www.roadsforwater.org))
   - Promotional training (webinars, blogs, presentation at events) within Bank
   - Introduce technical training with (country) training institutes
   - Guided learning
   - Monitoring and learning: promote and update Guidelines as live document
   - Outreach to programs of different organizations

3. **On the Ground Support**
   - Special support to road and water investment projects (training, assessment, design)
   - Support to national guidelines and capacity building
   - Feed into Community of Practice
Focus on recovery …

Predicted food security outcome in Southern Africa, February to May 2020 (left) and June to September (right). Source: FEWS NET

Number of confirmed COVID-19 cases in the WHO African Region by country, 25 February – 7 April 2020. Source: WHO

Emergencies (droughts, locusts) do not go away:
• The rainy season across Southern Africa in 2018/19 was one of the driest on record for nearly 40 years
• The severe drought has resulted in below-average regional cereal output and increasing food insecurity across many countries
• Livestock conditions are poor across southern and central areas of the region
• The number of food-insecure people in Southern Africa is projected to peak at 12.5 million through March 2020
• The significant deterioration in food security conditions is mainly due to reduced harvests that have cut household food stocks

On top of this COVID-19 – infection and quarantaining
• Increased morbidity and mortality
• No movement of daily farm labour:
  • Loss of income of most vulnerable group
  • Affects harvested quantities (esp of perishables)
  • More weed infestation – more weed seeds mixed with grains
• Slowed down operations of agri-business and agricultural frontline workers
Recovery….

- Roads are vital to reach highly affected areas – focus on durable rural/community roads
- Access to water key to Public Health
- Labour programmes: build back better – make road water harvesting and road water management part of community road building

Maps indicating the number of people reached by WFP, in collaboration with partners, in provinces affected by cyclones Idai and Kenneth and floods (as of 17 June 2019). Source: WFP
Building back better

Employment opportunities for rural communities on road construction
Related sources

- Green Roads for Water website
- Green Roads for Water Guidelines (supported by the World Bank)

Videos:

- Green Roads for Water: The pitch
- Making Roads Work for Water: Local Impressions - Mozambique
- Making Roads Work for Water: Impressions from Mozambique
- Gender, Rural Roads, and Transport
- Road Water Harvesting in Tigrai, Ethiopia
- Kenya- Catching Road Runoff in Ponds
- Connecting Roads, Water, and Livelihoods in Uganda
- Roads for Water: Experiences from Malawi
- Roads for Water: Zambia
Please join
Thank you!

Converted borrow pit for water storage

يرجى الانضمام شكرا لك!

Participe Obrigado!

Veuillez vous joindre Merci!