REPUBLIC OF KENYA
MINISTRY OF ROADS AND TRANSPORT
STATE DEPARTMENT FOR ROADS

CLIMATE RESILIENT ROADS: GREEN INFRASTRUCTURE

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AFRICA & KENYA

AFRICA AT A GLANCE

- **Geography**: Second-largest continent spanning 30.4 million km², with 54 countries across diverse ecological zones
- **Population**: 1.4 billion people (2023), the world's youngest population with median age of 19.7 years
- **Regional Integration**: AfCFTA (African Continental Free Trade Area) success depends on quality transportation networks
- **Economic Growth**: 5 of the world's 10 fastest-growing economies, with infrastructure development as a key enabler. Key Sectors include Mining, Energy production, services sector, Tourism and Hospitality

Kenya At a Glance

Strategic Position

Gateway to East Africa, key hub for the 177M-strong EAC market
Nairobi: Regional diplomatic and business hub

Geography

580,367 km² with diverse landscapes (coastal plains, highlands)
53.8M people (2023), 28% urban concentration.

Economy

Leading in agriculture, tourism, and tech innovation ("Silicon Savannah")
Mombasa: Major port and trade gateway to East Africa

Infrastructure Vision

240,000 km road network 11% paved, 42% Gravel and 47% Earth
Development guided by SDG 3,9 and 11 ,Kenya Vision 2030 BETA& AU Agenda 2063.

Key issues and challenges on the infrastructure development in Kenya.

1. **Physical Risks**
    - **Heat Damage:** Joint buckling, bitumen deterioration, surface dressing failures.
    - **Storms & Flooding:** Overwhelmed drainage, infrastructure damage.
    - **2024 El Niño:** Bridge overtopping,road section washouts; $287M (KES 37.3Bn) repairs.

2. **Transitory Risks (EV Adoption)**
    - **Fuel Levy Loss:** Less fuel consumption affects Roads Maintenance Fuel Levy (RMFL).
    - **Vehicle & Battery Disposal:** Environmental & logistical challenges.

3. **Geographical Disparities**
    - **Poor Road Access:** Northern regions Rural Access Index (RAI) 11 vs. national 60.

4. **Materials Shortage**
    - Gravel Depletion: 42% of roads rely on gravel, but supplies are dwindling

Key issues and challenges on infrastructure development in Kenya.

5. **Funding Gaps**

- 20-30% budget deficits in annual road development budgets**.**

6. **Aging Infrastructure & Standards**

- Outdated design standards don't fully address climate change.
- Limited use of alternative materials & methods.

7. **Knowledge & Human Capacity Gaps**

- Few experts in climate resilience & modelling.
- Limited road user education on climate adaptation.

7. **Road Safety**

- **~**3,000 fatalities annually due to poor safety infrastructure

8. **Rural Connectivity**

- Last-mile access remains a challenge in farming areas.

Vision & New initiatives

1.Roads Sector Investment Programme (2023-2027)

- Medium-term plan for National & County roads.
- Shifts from reactive repairs to proactive maintenance.

2.Climate-Resilient Bridges Project

- Strengthens national trunk roads to withstand heavy rains.
- Upgrades 22 bridges and desilts culverts for better drainage.

3.Climate Change Integration in Road Projects

- Vulnerability assessments now included in road planning.
- Isiolo-Mandera Road assessment provides key adaptation insights.

4.Tree Planting Initiative

- Kenya targets 15 billion trees by 2032.
- Ministry of Roads & Transport to plant 5.6 million trees annually.

5.Transition to Electric Mobility (By 2050)

- 5,000 EV charging stations to be deployed.
- 10,000 EV government vehicles in service.
- 10,000 electric buses for public transport.
- 30% of new vehicle registrations to be Evs

6.Development of new Road Design Manuals

- New Road & Bridge Design manuals that integrate climate change consideration currently under development

Successful example and best case

Isiolo-Mandera Road Project (740 km)

- Isiolo-Mandera Road Corridor (HoAGDP) is a critical transport link in arid Kenya. Project is ongoing under World Bank funding. Security concerns near the Somali border may hinder maintenance.

- **Climate Change Hazards & Impacts**
  - **Flooding:** Frequent washouts, waterlogging, and impassable roads
  - **Erosion & Scour:** Degradation of embankments and road base
  - **High Temperatures:** Accelerated pavement wear and maintenance issues*
  - **Rainfall Increase:** 3-6% rise in daily maximum rainfall projected by 2090*
  - **Storm Frequency:** 100-year storms could occur every 85 years by 2050*

***World Bank. (2018).** *Increasing Climate Resiliency of Kenya's Road Network: Interim Report 2.* August 2018.

Successful example and best case

- **Priority Adaptation Interventions**
  - **Flood Protection:** Gabion installations, stone pitching, and improved drainage
  - **Bridge Reinforcement:** Geotextiles and riprap to prevent scour damage
  - **Overtopping Prevention:** Raised roadways and additional culverts
  - **Sedimentation Control:** Routine maintenance to clear sand deposits
  - **Lorian Swamp Stability:** Geo-textiles and gentle embankment slopes (1:3).
- **Road Network Management & Institutional Strategies**
  - **Data Collection:** Install monitoring stations for rainfall and streamflow.
  - **Emergency Response Plans:** It is proposed to stockpile repair materials at Mado Gashi and Mandera depots.
  - **Resilient Asset Management:** Update hydrological models to factor in climate change.

Successful example and best case

- **Socio-Economic Benefits**

- **Reduced Economic Losses:** Prevents costly road closures and trade disruptions.
- **Long-Term Cost Savings:** Investing in resilience lowers future maintenance expenses.
- **Regional Connectivity:** Ensures sustainable development and infrastructure longevity.

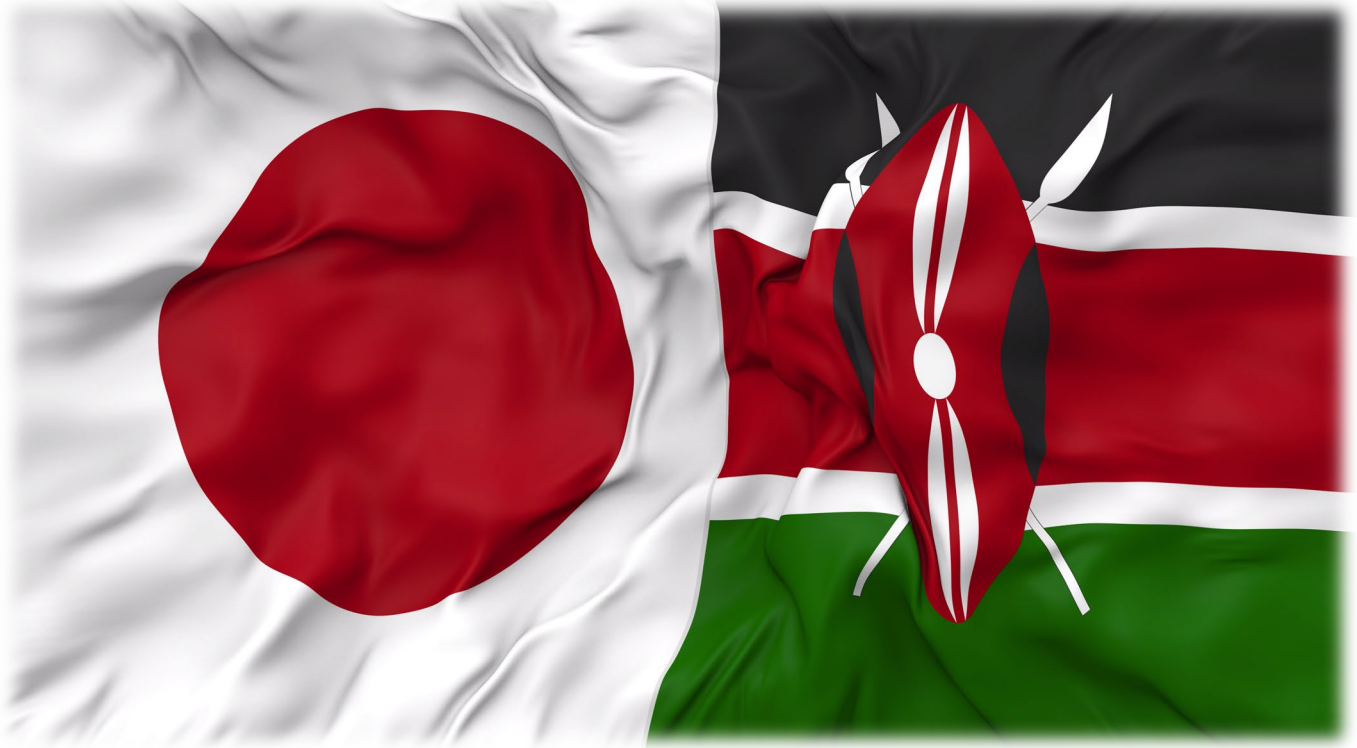
- Culverts in series km 140-141

- Raised Embankment

- Triple cell box culvert

Expectations from the workshop

- **Knowledge Exchange**: Learn international best practices in climate-resilient road technology
- **Technology Assessment**: Identify cost-effective smart infrastructure solutions suitable for developing economies
- **Partnership Development**: Connect with potential development partners and technology providers
- **Capacity Building**: Enhance expertise in emerging road management technologies



AHSANTE SANA!

ARIGATŌ GOZAIMASU!

THANK YOU VERY MUCH!