Setting the Scene: Climate resilient urban transport – the global challenge

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Climate Resilient Urban Transport

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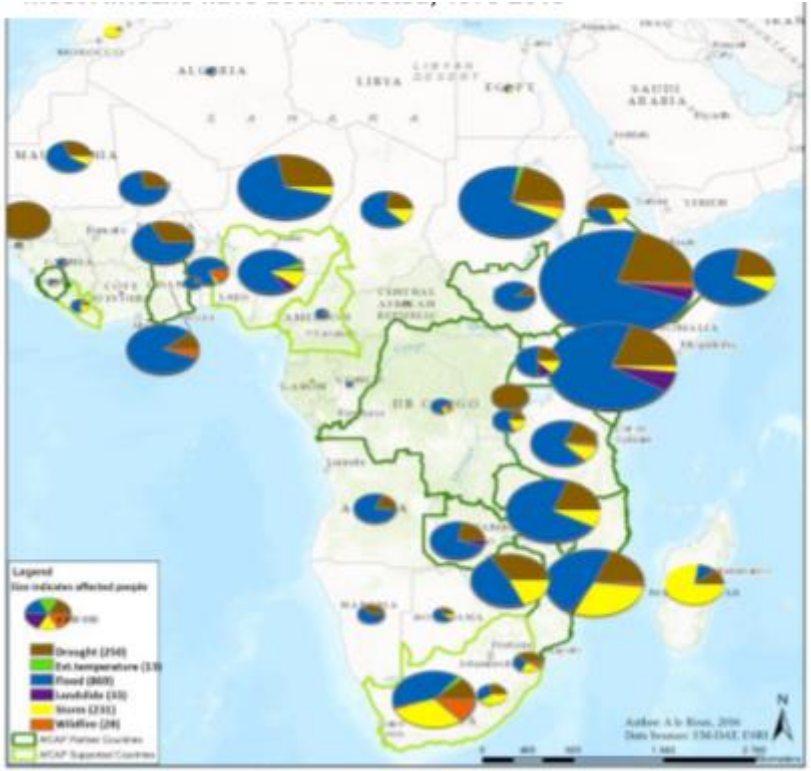
Global warming

Already 1.0°C warmer than pre-industrial times

→ hotter temperatures, worse storms, more intense rain and flooding, as well as higher sea levels affect transport systems

Africa most vulnerable to the impacts of climate



1400 weather related disasters affecting 460 million people over last 40 years

Africa most vulnerable to the impacts of climate

Adaptation costs could be in the region of $20 – 30 bn per annum over last decade

Outline of the problem

Challenges of climate resilient transport

Climate-related disasters increase

Floods, 43.4%, and storms, 28.2%, are the two most frequently occurring disasters.

Source: UN Office for Disaster Risk Reduction; https://www.unisdr.org/archive/61121

Direct economic losses of climate-related disasters have risen 2.5 times over the past 20 years,

reaching 2,245 billion US$ or **77%** of total disaster-related costs (in the period 1998-2017).

“Is not about spending more, but about spending better”.

Flood-related transport disruptions costing Tanzania over USD 100 million annually.

Urban population of 4.2 billion

+68million/a - developing countries contribute 91% of this growth

High exposure to climate impacts due to dense transport infrastructure – often operating at or beyond capacity

New investments provide an opportunity … but investments are also at risk of climate impacts

Only 5% of assets are insured in Low Income Countries
vs. 50% in High Income Countries

Photo source: The Citizen; https://www.thecitizen.co.tz/News/Tanzania-admits-BRT-project-blunder/1840340-4577630-6w1sbdz/index.html

All transport modes are affected

Land slide in Bogor, Indonesia obstructs the services of the commuter line Jakarta – Bogor

Many cities are located along the coast

Making them particularly vulnerable to sea level rise and storm surges

Harbours are also at risk …

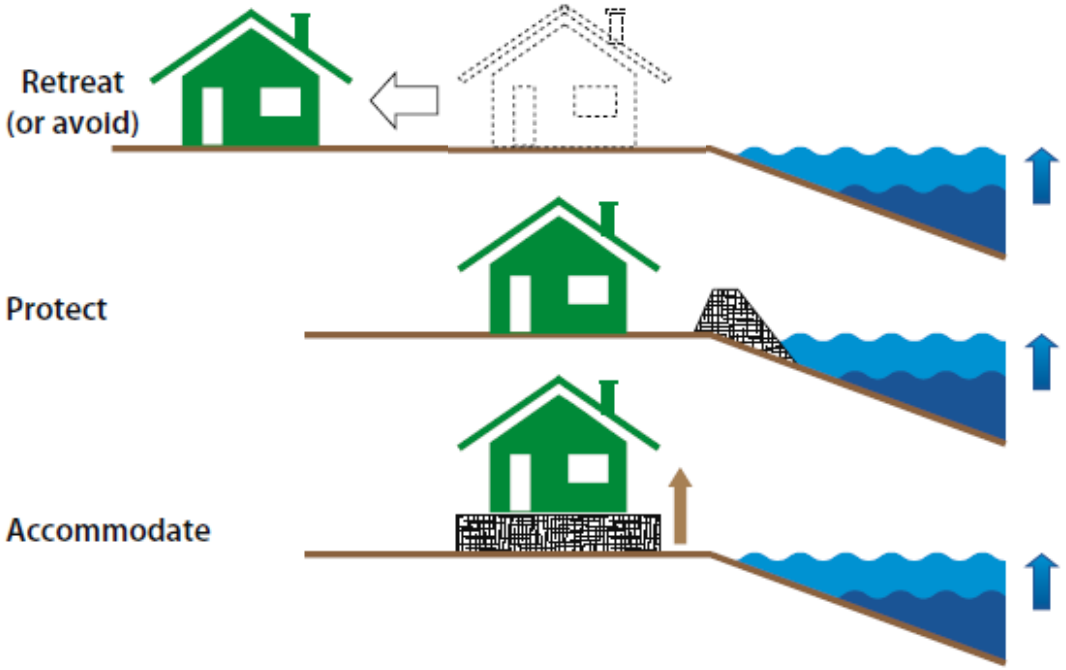
Climate resilience must be addressed at different scales – single infrastructure versus network performance

Many good reasons to adapt urban transport to climate change…

Climate impacts can affect the transport sector in three major ways

1. Impacts on transport infrastructure (planners and engineers)
2. Impacts on operations & vehicles (operators, emergency planners)
3. Impacts on mobility behaviour of people (urban residents)

3 basic approaches to adapt infrastructure to climate change impacts



→ Approach developed in the context of sea-level rise, but generally applicable to all climate risks

This can happen if you don‘t …

Dar Es Salaam Bus Rapid Transit operators ignored an Environmental Impact Assessment:

- The main depot was built into a frequently flooded area
- It has already been flooded several times since operations began in 2016
- Operations had to be suspended several times
- Buses have been damaged
- Costs to the operator are significant

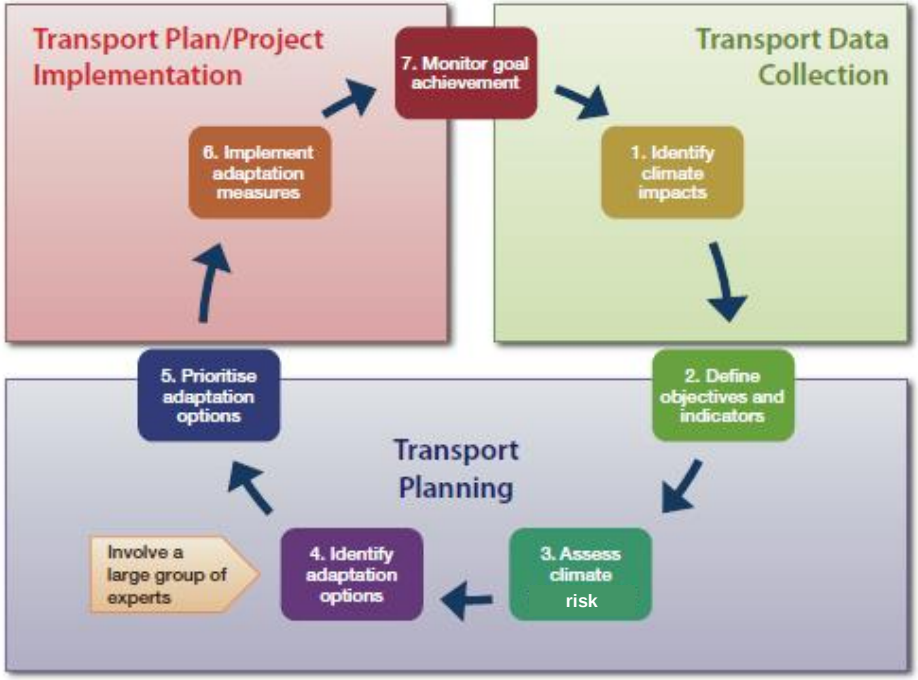
Photo source: The Citizen; https://www.thecitizen.co.tz/News/Tanzania-admits-BRT-project-blunder/1840340-4577630-6w1sbdz/index.html

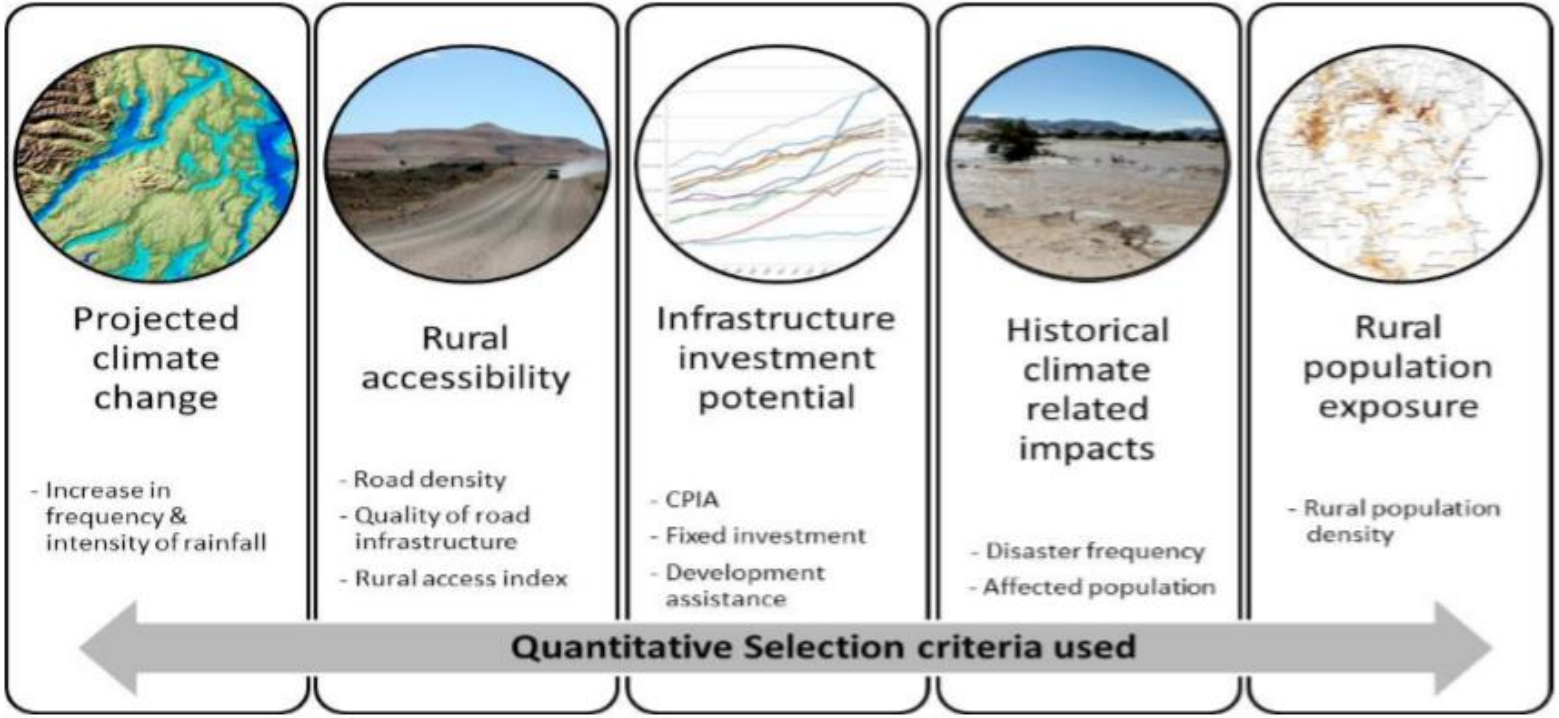
“Integrating disaster risk reduction into investment decisions is the most cost-effective way to reduce (hazard) risks”

UNISDR (2018) Economic Losses, Poverty and Disasters 1998-2017

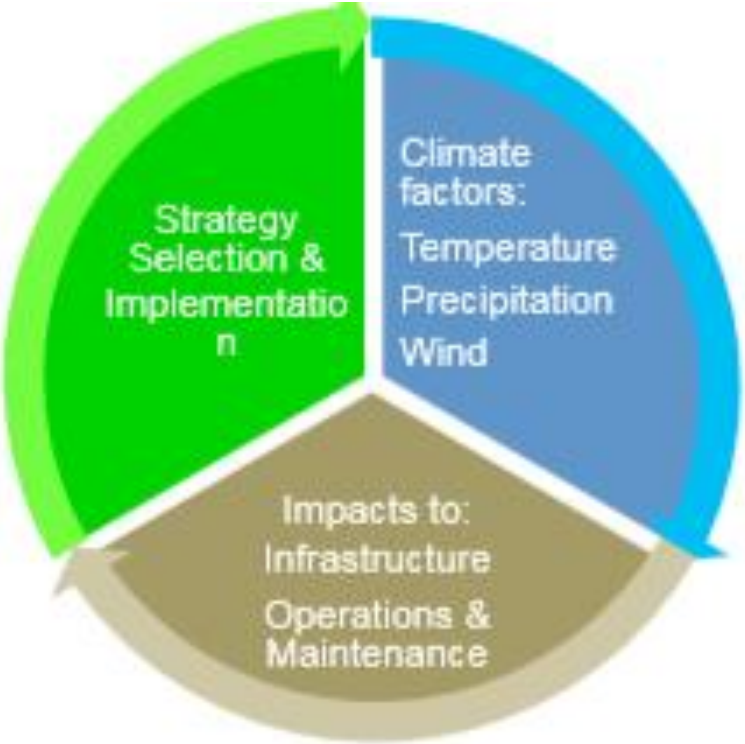
Integrate climate-resilience into existing processes

Climate-resilience needs to be integrated into all steps of transport or infrastructure planning, design and implementation.

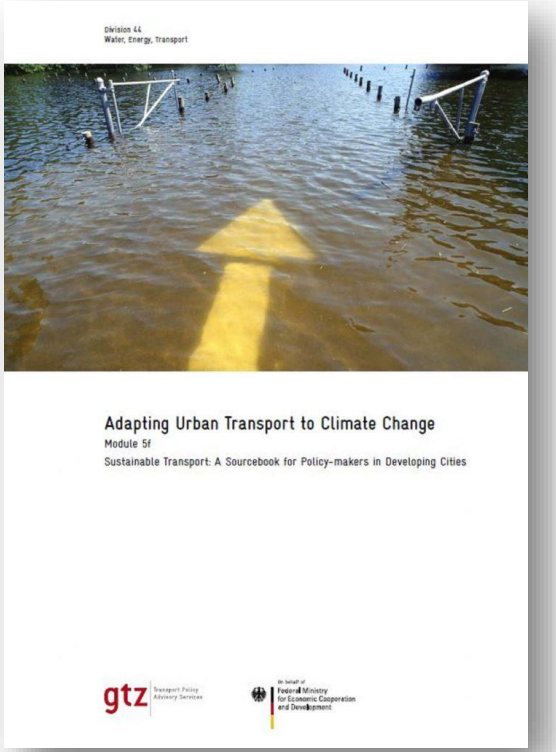



Projected climate change
- Increase in frequency & intensity of rainfall
Rural accessibility
- Road density
- Quality of road infrastructure
- Rural access index
Infrastructure investment potential
- CPIA
- Fixed investment
- Development assistance
Historical climate related impacts
- Disaster frequency
- Affected population
Rural population exposure
- Rural population density
Quantitative Selection criteria used

Designing Climate-Resilient Roads for Long-Term Rural Access



References: RECAP Handbooks & GIZ Sourcebook



GIZ project portfolio

GIZ climate change adaptation expertise - examples

Climate Services

Climate services for infrastructure investments, Costa Rica:
Climate data is considered when planning and investing in

Adapting public investment to climate change

Climate risk management, e.g. Peru:

Adaptation Planning in Cities

Cities fit for Climate Change, e.g. Chile:
Climate aspects were taken into account in the upgrading of a 12 km section of a main road in Santiago.

Digital Coastal Monitoring Using Lightweight Drones

Drone-supported costal protection, Vietnam:
Using new techniques such as the flycams (light-weight drones) for systematic monitoring of remote coastal areas, forest and coastline management and the inspectio

Climate Resilient Urban Transport

Training, Indonesia:
Introducing the concept of climate resilience in transport and approaches to assess climate vulnerability of urban transport systems.

Ecosystem-based Adaptation

Costal Protection, Vietnam:
Supporting adaptation measures by building breakwaters along the Mekong Delta's coastline to protect the hinterland and save the

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sessment, Tansania:
e risk evaluation and
ding risk transfer
surance in Dar

nt transport systems. Business opportunities

Focus: Resilient transport components

Pilot implementation: Greening highways in Morocco to adapt to the effects of wind erosion

Approach
Development Public Private Partnership

Activities
- Drone-based risk analysis of motorways vulnerability map
- Tested 20 different plants and hard infrastructure to combat wind erosion, tried out three and choose the most appropriate one.
- Climate change adaptation measures (erosion protection) implemented along stretches of the highway that are threatened by heavy rainfall and erosion
- Upscaling planned in DPP Phase II for longer motorway stretch

Impacts
- Sustainable stabilisation of 100km of motorway infrastructure (efficient, using local material, heat resistant plant)
- Employment opportunities for local youths

Pilot implementation: climate proofing a bridge in Costa Rica

Approach
Climate risk analysis + adaptation planning for existing infrastructure

Activities
- German weather service (DWD) provides meteorological data on climate impacts
- Engineers Canada assess the climate risk for the pilot bridge
- The Canadian PIEVC climate risk analysis protocol is “localized”
- Local officials are trained conduct climate proofing themselves
- Local partners (ministries of environment & planning) are advised how to improve existing climate services

Impacts
- Pilot bridge is climate proofed
- Decision makers consider climate impacts in planning processes

Building, assessing and mapping transport infrastructure in post-conflict Liberia

Approach

- Advisory of the public partners on low-cost and climate resistant technologies for road construction
- Facilitating cooperation and knowledge transfer between public and private partners

Activities

- Building climate-proof road infrastructure by using new technologies
- Assessing the state & establishing a database of bridges across the country using local capacity and graduate students
- Training of government officials and advisory on establishment of a data-based annual road & bridge maintenance plan
- Institutional support of local businesses in the road construction sector to be more competitive, to improve their services and quality of work

Impacts

- Registry of the bridge infrastructure with emphasis on climate vulnerability
- Building climate proof road sections as pilot projects
- Employment opportunities and job training for local youths

Improving the quality of urban planning for complete and green streets in Mexico

Approach

Consulting national and local governments to improve the sustainable planning processes in the transport sector

Activities

- Aid cities in promoting sustainable transport that takes climate factors (such as heavy rainfall) into account
- Organise events like the "Green Infrastructure and Climate Change Forum" intensify the exchange of experiences between relevant stakeholders at city and federal levels.
- Identify urban areas with potential for densification, support the development of integrated plans for sustainable urban mobility, promote local public transport and active cycling and walking
- Support municipalities in integrating the social and economic value of green spaces and biodiversity in urban planning

Impacts

A roadmap was defined in collaboration with local authorities, civil society organisations, academia and international organisations.

Thank you for your attention!

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Training on climate resilient urban transport systems

Approach:
Train decision makers and transport system planners about tools that help assess climate risks and using measures to climate-proof transport infrastructure and services

Activities
- Introducing the concept of climate resilience in the transport sector
- Informing about approaches to assess climate vulnerability of urban transport systems

Impact
- Resilient urban transport systems are able to cope with impacts, without long-lasting disadvantages for its users and urban life as a whole
- Workshop participants are aware of solutions for managing the challenges of climate resilient urban transport

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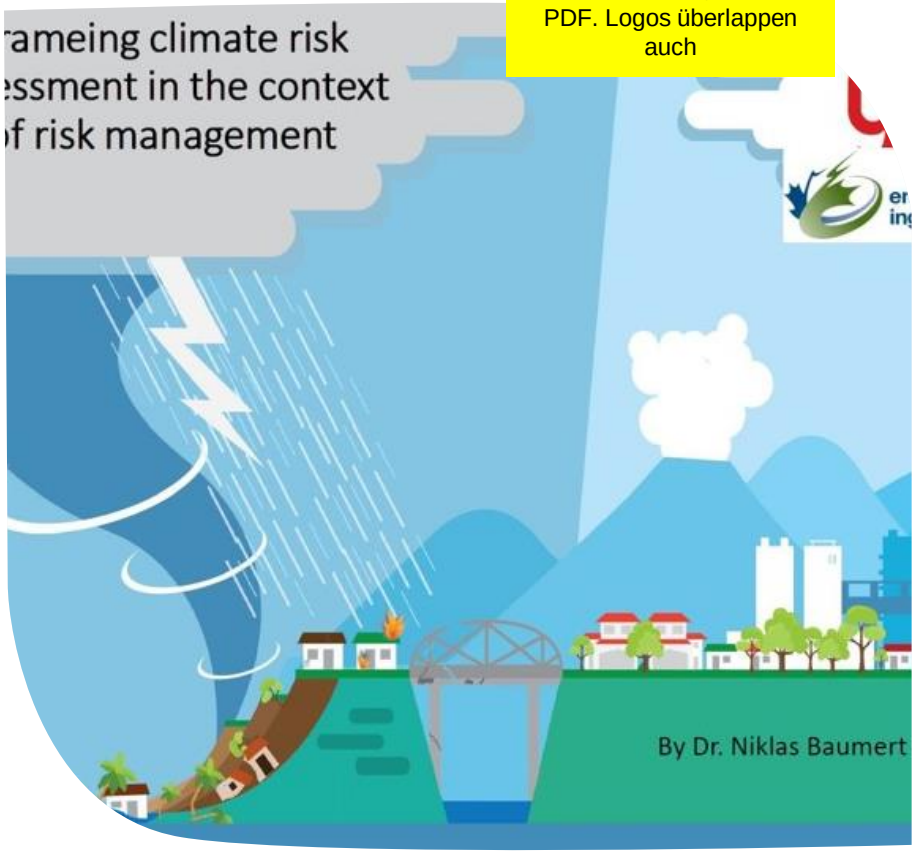

RECAP Handbook and supporting guideline