IMPROVING ROAD NETWORK RESILIENCE

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Road Technical Committee, Belgrade 2020
Why WB6 should act on Network Resilience?
Why we should think about Network Resilience?

• Climate change is putting at risk the lives of millions of people worldwide, and millions in investments in transport infrastructure and services.

• A transport system that cannot withstand the emerging impacts of climate change will prove burdensome, impose high costs for repair, and cause significant economic losses.

• May 2014 floods, triggered 4% of GDP losses in SRB, 15% of GDP in BIH and August 2016 in MKD losses up to €22 million
Adaptation Strategies and actions

**Climate Changes**
- Extreme precipitation
- Rising sea levels
- Temperature spikes

**Impacts on Transportation**
- Roadway flooding
- Damage/destroy of bridges
- Pavement and rail buckling
- Subway flooding
- Seaport and airport flooding
- Slope failures
- Curtailment of barge operations

**Consequences**
- Freight traffic disrupted for days or weeks
- Power plants, water facilities, homes
  businesses, hospitals cut off
- Passenger travel delays
- Higher transportation costs for government, businesses, and households
- Evacuation of urban areas

**Adaptive Strategies to Reduce Impacts**
- Retrofit facilities
- Relocate facilities
- Upgrade stormwater drainage facilities
- Build new facilities to climate-ready standards
- Protect existing infrastructure
- Incorporate climate change into maintenance cycles

**Adaptive Strategies to Reduce Consequences**
- Re-route freight and passenger flows
- Shift to alternative modes
- Land-use regulations relating to development in vulnerable areas
- Evacuation/contingency strategies
- Building in network flexibility
- Traveler information systems
- Rapid rebuilding of damaged facilities
- Improved air traffic management
Scoping Phase Findings – Legal framework

National Level
- Climate change policies, strategies

Transport
- Transport Resilience Strategy
- Action Plan

Implementation
- Methodology
- Vulnerability assessment
- Tools and monitoring
# Scoping Phase Findings – Legal framework

<table>
<thead>
<tr>
<th>RPs</th>
<th>National level</th>
<th>Transport Resilience strategy</th>
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</thead>
<tbody>
<tr>
<td>ALB</td>
<td>UNFC on Climate change ratified CCS prepared</td>
<td>No Cross sectoral strategy ongoing</td>
</tr>
<tr>
<td>BIH</td>
<td>UNFC on Climate change ratified Yes</td>
<td>No Cross sectoral strategy ongoing</td>
</tr>
<tr>
<td>MKD</td>
<td>UNFC on Climate change ratified UN National Communications</td>
<td>No</td>
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<tr>
<td>MNE</td>
<td>UNFC on Climate change ratified UN National Communications</td>
<td>No</td>
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<tr>
<td>KOS</td>
<td>UN National Communications</td>
<td>No</td>
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<tr>
<td>SER</td>
<td>UNFC on Climate change ratified UN National Communications</td>
<td>No Cross sectoral strategy ongoing</td>
</tr>
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Scoping Phase Findings – Risk areas

- Landslides and unstable slopes along highways, main roads and railways;
- Transport infrastructure in the vicinity of river flows which can be affected by floods;
- Rising groundwater levels;
- Floods in spring and summer and snowdrifts in winter periods;

### Weighted average cost EUR/km and Effectiveness

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Weighted average cost EUR/km</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridges and crossings</td>
<td>127,380</td>
<td>51.96%</td>
</tr>
<tr>
<td>Drainage</td>
<td>64,078</td>
<td>58.16%</td>
</tr>
<tr>
<td>Erosion and stabilisation</td>
<td>119,420</td>
<td>66.69%</td>
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<tr>
<td>Flood protection</td>
<td>395,836</td>
<td>87.87%</td>
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<tr>
<td>Landscaping</td>
<td>204,256</td>
<td>25.32%</td>
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<tr>
<td>Monitoring &amp; maintenance</td>
<td>18,421</td>
<td>30.73%</td>
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<tr>
<td>Operation incident reporting</td>
<td>65,090</td>
<td>28.30%</td>
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<tr>
<td>Planning, design &amp; construction</td>
<td>85,988</td>
<td>35.52%</td>
</tr>
<tr>
<td>Road surface and structure</td>
<td>39,886</td>
<td>31.73%</td>
</tr>
</tbody>
</table>

Source: World Bank, DIVERSION project
Scoping Phase Findings - Obstacles

Main obstacles listed by the regional participants:

- Lack of knowledge
- Lack of guidelines and methodologies to assess vulnerability
- Lack of resources human, financial etc
- Lack of coordination between the ministry in charge of environment and transport ministry/institutions
Recommendations

- Development of guidelines and methodologies to assess transport systems vulnerability to climate change
- Development of Resilience Action Plan for Core/Comprehensive Networks
- Carry out risk based vulnerability assessment for indicative extension of Core/Comprehensive TEN-T Networks in Western Balkans or pilot in one of the Core Corridors
- Development of Transport Resilience Strategies and Action Plans;
- Implementation of adaptation strategies, measures and techniques.
Thank You