Adaptation and Climate Resilience – We are Transport

80% of the world’s population lives on coastal plains or near rivers, adapting our transport networks to a new climate is a BIG issue

Did you know that?

1. Countries are investing massively in transport infrastructure – an estimated global spending of $1.4 to 2.1 trillion per year. But very few are actually aware of the impact climate change will have on that infrastructure and how best to plan for that impact.

2. While the attention of most countries and other actors in the transport sector is still largely focused on climate change mitigation, it is encouraging to see that initial building blocks for greater action on adaptation in the transport sector are in the process of being developed.

3. COP 21 is a unique opportunity to rally governments and development partners around building more substantive and comprehensive approaches in the area of transport adaptation and resilience.

Narrative

The daily functioning of most transport systems is sensitive to fluctuations in precipitation, temperature, winds, and visibility. Coastal cities or those located near rivers are at greater risk of flooding and damages from rising sea levels and flash

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1 From the UNCRD paper “Adaptation in the Transport Sector in Asia – Recommendations for COP21” (produced by SloCat)
flooding. In road transport, paved roads are particularly vulnerable to temperature extremes, while unpaved roads and bridges are more vulnerable to precipitation extremes. Rail system failures are known to be related to high temperatures, icing and storms. Urban public transport system are most vulnerable to flooding as was demonstrated in the case of Super-storm Sandy in New York in 2012 or Prague in 2005. All of these impacts have consequences on the design, construction and alignment of roads, railways and other transport infrastructure.

Less-developed countries located in Asia, Africa and Latin American and the Caribbean (LAC) are already suffering the effects of climate change. Asia is particularly subject to risks such as sea-level rise, changes in permafrost conditions and locations, changes in precipitation, and increases in the frequency and intensity of storms, floods and droughts. In Africa and the LAC region, a combination of increased rainfall, prolonged droughts, rising sea levels, and tidal surges puts the stability of the transport systems at risk, and thus poses significant impacts to these countries’ economies. Cities and urban

Various regions in the developed world would have slightly different impacts for the transport sector to adapt to climate change. For example, in North America, significant climate impacts for transport systems are projected due to flooding of coastal roads, railways, transit systems, and runways because of rising sea levels. In Europe, sea level rise, storm surges and waves are likely to induce major impacts, including flooding of airports, roads, rail lines and tunnels. Similarly, flooding from intensifying rainfall, as well as other associated extreme events (e.g. landslides), will increase the risks of disruptions or delays in air, rail and road transport.

Considerable progress has been made in the last decade to promote mitigation of climate change in the transport sector, but it is encouraging to see that initial building blocks for greater action on adaptation in the transport sector are in the process of being developed. Substantive work on improving the knowledge base on adaptation to climate change in the transport sector is ongoing, which includes guidelines and toolkits for major modes of transport, including roads, railways, and waterways, and sector-wide summary reports capture comprehensive efforts to increase resilience for public transport, roadways, and the transport sector more broadly in the United States and Europe.

Despite these encouraging steps toward broader transport adaptation measures, the attention of country delegations, subnational actors, and international funding institutions is still largely focused on climate change mitigation in the transport sector. This is reflected in the sizeable number of mitigation-oriented projects, and the large number of countries that have specified mitigation activities through INDCs submitted to the UNFCCC. In contrast, far fewer countries have included transport-specific adaptation measures specific in their INDCs. Similarly, NAPs in developing countries show little detail toward transport measures, and the portfolios of funding institutions and climate finance instruments are still largely skewed toward mitigation rather than adaptation projects, especially in the transport sector.

**Evidence/data supporting those facts**

As much as 80% of the world’s population in both the developed and developing countries live in coastal regions or near river beds so all weather access, safety and
resilience to extreme weather events are crucial to local and global economies for our growing urbanized world.

- Eighty-four percent of the intended nationally determined contributions (INDCs) submitted towards an agreement under the United Nations Framework Convention on Climate Change by 147 Parties to the convention address adaptation on an economy-wide basis. However, only sixteen Parties identify transport among their priority areas for adaptation.\(^3\)

- Quantifying the cost of climate change on transport systems and benefits of adaptation are critical for the dialogue with countries and investors about long term plans and investments. Global estimates\(^4\) suggest that the cost to adapt to climate change in a 2°C warmer world is in the range of USD $70 billion to USD $100 billion a year by 2050. Infrastructure accounts for a large share of the adaptation costs and is particularly sensitive to annual and maximum monthly rainfall.\(^5\)

- Urban infrastructure – drainage, public buildings, and similar assets – account for about 54 percent of the infrastructure adaptation costs, followed by railways at 18 percent, and roads (mainly paved) at 16 percent. But the overall cost of inaction on adaptation for transport is not yet known.\(^6\)

- In Sub-Saharan Africa, projected climate risks are expected to cost an additional USD $5.2 billion in road maintenance requirements, for 11 corridors covering about 20,000 kilometers of paved primary roads, through 2050 – relative to USD $6.3 billion in a scenario without climate impacts. Upper end estimated of potential climate change impacts on the existing Sub-Saharan African transport network range from a 60% to 160% increase in scheduled maintenance cost.\(^7\)

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\(^3\) [www.slocat.net](http://www.slocat.net)  
\(^4\) Economics of adaptation to climate change synthesis report, 2010, the World Bank.  
\(^5\) Moving Towards Climate-Resilient Transport, 2015, the World Bank.  
\(^6\) Moving Towards Climate-Resilient Transport, 2015, the World Bank.  
\(^7\) Moving Towards Climate-Resilient Transport, 2015, the World Bank.
Examples and references

- A number of bilateral and multilateral development organizations are implementing a first generation of pilot projects on adaptation in the transport sector, and are in the process of developing policies and screening tools to assess climate risks for projects, including those in the transport sectors. In particular, the Nordic Development Fund is drawing lessons from eight adaptation-oriented projects in developing countries it is in the process of funding through co-financing with regional MDBs in Asia, Africa, and Latin America.

- In Namibia, estimated road rehabilitation needs following the 2008 floods included elevating roads and improving drainage in flood-prone areas (thus, costs were 5.5 times the replacement value of damaged structures).  

- In a recent example of response to extreme events, the Mississippi Department of Transportation (DOT) spent an estimated USD $1 billion on debris removal, highway and bridge repair, and rebuilding the Biloxi and Bay St. Louis bridges in the four years following Hurricane Katrina, and CSX spent USD $250 million rebuilding thirty miles of destroyed rail line. Longer term, a study by Associated British Insurers estimated that climate change could increase the annual costs of flooding in the United Kingdom almost 15-fold by the 2080s.

- More extreme temperatures alone can accelerate road deterioration, particularly in Central Asia. In parts of Kazakhstan, the government already has imposed restrictions on truck travel to limit wear and tear during the scorching summer months when the

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8 Building Resilience, 2013, the World Bank.
9 Transportation Adaptation to Global Climate Change, [year?], Bipartisan Policy Center.
asphalt softens. Elsewhere, changes in the freeze-thaw cycles can result in road damages. Specifically, degradation of the permafrost in northern and eastern Russia may affect a number of structures, including sections of the Trans Siberian Railway and airports serving remote communities in northern and eastern Russia.

During spring 2013, severe flooding affected several central European countries such as Austria, the Czech Republic and Germany. Transport and supply chains were severely disrupted in many areas, sometimes for a long time:

- The main railway bridge across the River Elbe in Germany, servicing all trains to and from Berlin via Hannover, including the important high-speed services Berlin–Frankfurt and Berlin–Cologne/Dusseldorf, was affected and remained closed until early November 2013. This led to disturbances in the whole network.
- In Austria, rail service was heavily impacted on the Brenner crossing, which had to be closed for more than a week. This closure led to disruption for long-distance trains from Germany to Italy via Austria.
- Due to high water, several waterways including sections of the Rhine, Neckar, Main and Danube and the Rhine–Main–Danube Canal had to be closed for merchant ships, leading to disruption in some supply chains.


As of April 2015, the Nationally Appropriate Mitigation Actions Facility had the highest transport-related funding share (29 per cent) of projects – a share relatively proportional to the sector’s contribution to the global energy-related GHGs (23 per cent). (Details available on the PPMC website [www.ppmc.org](http://www.ppmc.org))

**Key Players**


Nordic Development Fund [www.ndf.fi/](http://www.ndf.fi/)

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10 Adapting to Climate Change in Europe and Central Asia, 2009, the World Bank.
11 Adaptation of transport to climate change in Europe, 2014, EEA