

Joint UNECE-UNCTAD Workshop:

Climate Change Impacts on International Transport Networks

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Climate Change: An Adaptation Challenge for US Transportation

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UNCTAD – UNECE Climate Change Workshop

Climate Change: An Adaptation Challenge for US Transportation

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US Department of Transportation

September 8, 2010

Arctic warming will reduce sea ice causing erosion and thaw permafrost damaging infrastructure

- The USACE has identified over 180 communities that are threatened by erosion in Alaska



Loss of Shore-fast Sea Ice



These photos were taken 2 hours apart
This road no longer exists

Hurricane Katrina Damage to Highway 90 at Bay St. Louis, MS



Source: NASA Remote Sensing Tutorial.

More Focus/Better Information: A Growing National Concern



- First National Assessment, 2000
- 21 Synthesis and Assessment Products
- Second National Assessment, 2009
- National Academies: America's Climate Choices, 2009 and 2010
- Third National Assessment, underway

Climate changes are underway in the U.S. and are projected to grow

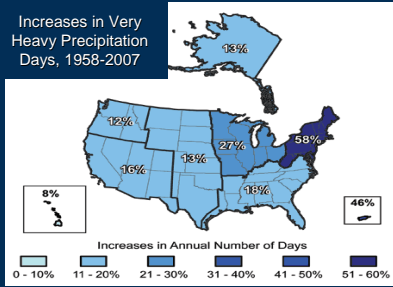
- Temperature rise
- Sea-level rise
- Increase in heavy downpours
- Rapidly retreating glaciers
- Thawing permafrost
- Longer growing season
- Longer ice-free season in the ocean and on lakes and rivers
- Earlier snowmelt
- Changes in river flows

Observed U.S. Sea-Level Changes



Floods and Droughts Will become more common

Increases in Very Heavy Precipitation Days, 1958-2007

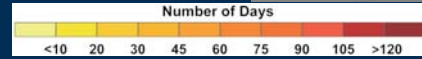


Increases in extreme heat

Number of Days Over 100°F
Recent Past, 1961-1979



Higher Emissions Scenario,
2080-2099



Why this matters: Transportation Impacts

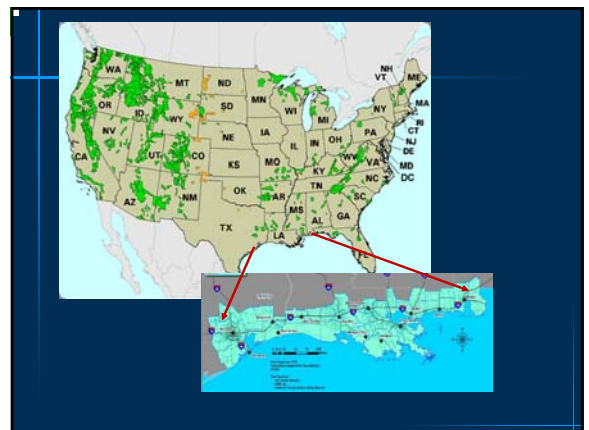
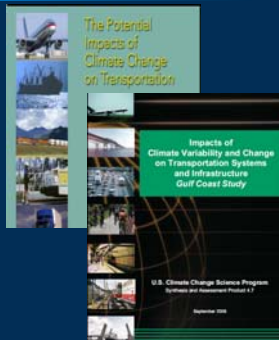
CLIMATE EFFECT	IMPACTS
Higher high temperatures, more hot days	<ul style="list-style-type: none"> Asphalt deterioration Thermal expansion of bridge joints, paved surfaces Changes to biodiversity (impacting pest management, wetlands commitments) More night time work, longer construction season Pavement & structural design changes
Wind speeds	<ul style="list-style-type: none"> More frequent sign damage, truck rollovers Changes to testing of and design factors for wind speed Need for stronger materials
More frequent, intense precipitation	<ul style="list-style-type: none"> Loss of visibility, lane obstruction Increase in weather-related delays, traffic disruption Increased flooding of roads, evacuation routes Increased peak stream flow could affect scour rates, influence size requirements for culverts Standing water could affect structures adversely

Why this matters: Transportation Impacts

CLIMATE EFFECT	IMPACTS
Increased coastal storm intensity	<ul style="list-style-type: none"> Increased storm surge and wave impacts on roads, bridge structures, signs, etc. Decreased expected lifetime of highways exposed to surge Damage to infrastructure caused by the loss of coastal wetlands and barrier islands Erosion of land supporting coastal infrastructure
Sea level rise	<ul style="list-style-type: none"> Permanent inundation of some roads and areas, reduced route options/redundancy Erosion of road base Reduced clearance under bridges Exposes new areas to effects of surge/wave action, potentially causing interruptions to coastal roads May amplify storm surges in some cases, requiring greater evacuations

More Focus/Better Information US DOT Efforts

- Potential Impacts Workshop, 2002
- Gulf Coast Study, Ph. I, 2008
- Current US DOT Efforts
 - Adaptation Strategy
 - Regional Typology
 - Vulnerability and Risk Pilots
 - Gulf Coast, Ph. II
 - Peer Exchanges



Results – Gulf Coast Study

Ports Vulnerable to Relative Sea Level Rise

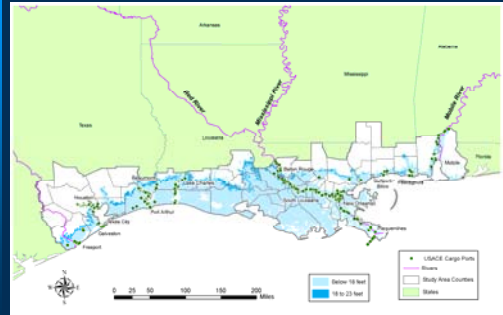
Baseline (Present Day)

2 - 4 Feet of Sea Level Rise



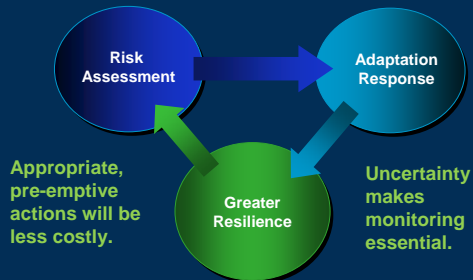
Study ('08) results based on IPCC4: 7 – 23" SLR
Global Climate Change Impacts in US ('09): 36 – 48"

Freight Handling Ports Facilities Potentially Vulnerable to Storm Surge



Thoughts on Effective Adaptation: Reliability under a range of conditions

New approaches to decision-making:
scenario planning and risk assessment



Thoughts on Effective Adaptation Levels of Implementation

- Planning or Strategic Level
 - Regional scale
 - Land uses
 - Critical services
- Transportation Facility Level
 - Local scale
 - Public and Private sectors
- Research and Development



US Climate Change Adaptation Task Force

- Managed by the President's Council on Environmental Quality
- Initial Workgroups:
 - Agency adaptation; international; science; insurance; water
 - Expanded topics: urban, health, ecosystems, etc.
- Working on recommendations towards a national strategy in October, 2010
 - Focused on US Government actions