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Tackling “Slowness & Uncertainty” for Effective Port Adaptation

Presentation by

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Tackling "slowness & uncertainty" for effective port adaptation

Dr. Satoshi Inoue
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Intensified hurricanes hitting ports

New Orleans hit by Catrina, 2005
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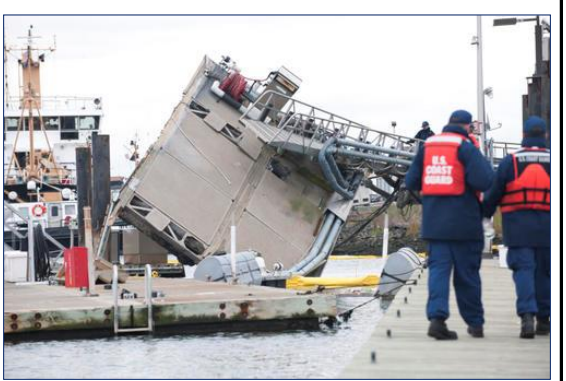

Port of New York & New Jersey hit by Sandy, 2012
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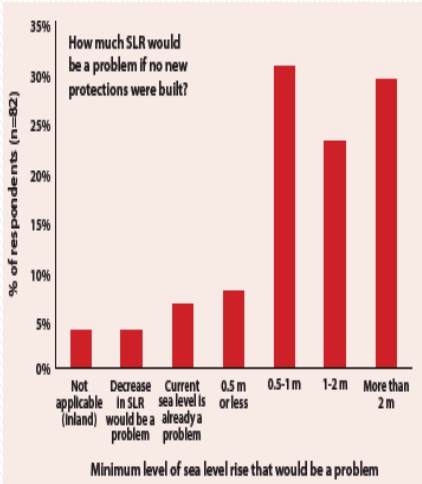
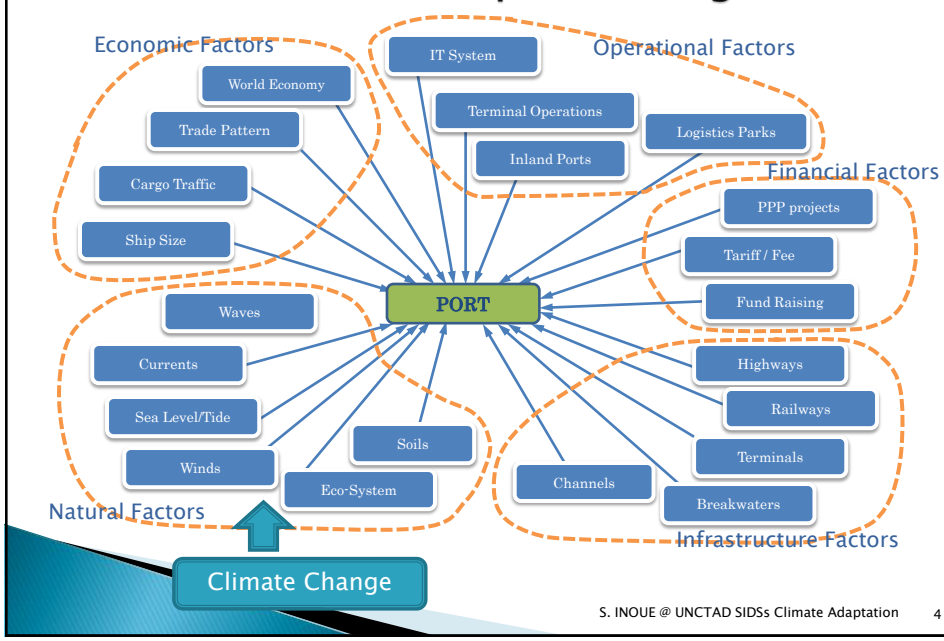
Concerns and problems of port managers

- IAPH survey on port adaptation shows:
  - Most of port managers are concerned about climate change risks to their ports.
  - However, only a few ports have placed clear policy of adaptation.
  - Most of ports felt not well informed of climate risks, nor much discussed adaptation issues.
  - They felt the serious lack of reliable information, in particular predictions of localized climate change

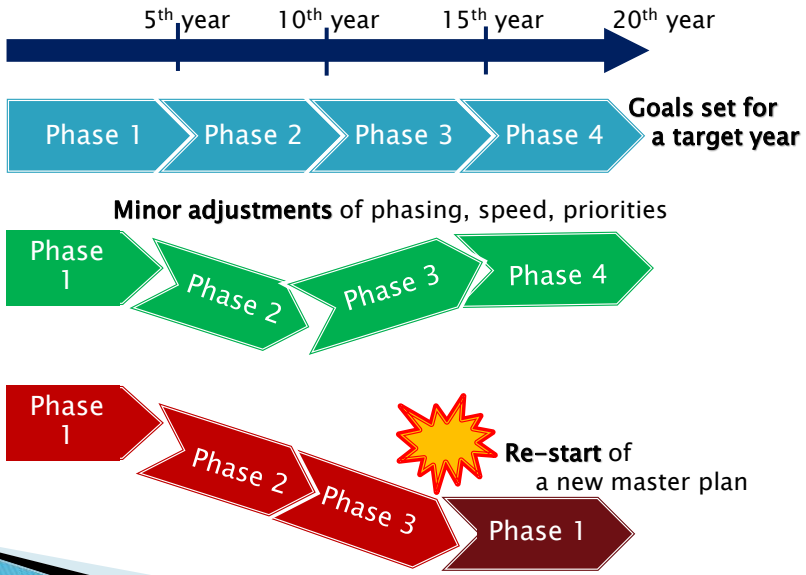


Source: IAPH Journal Ports & Harbors, 2010

Critical factors for port management



Port planning and development



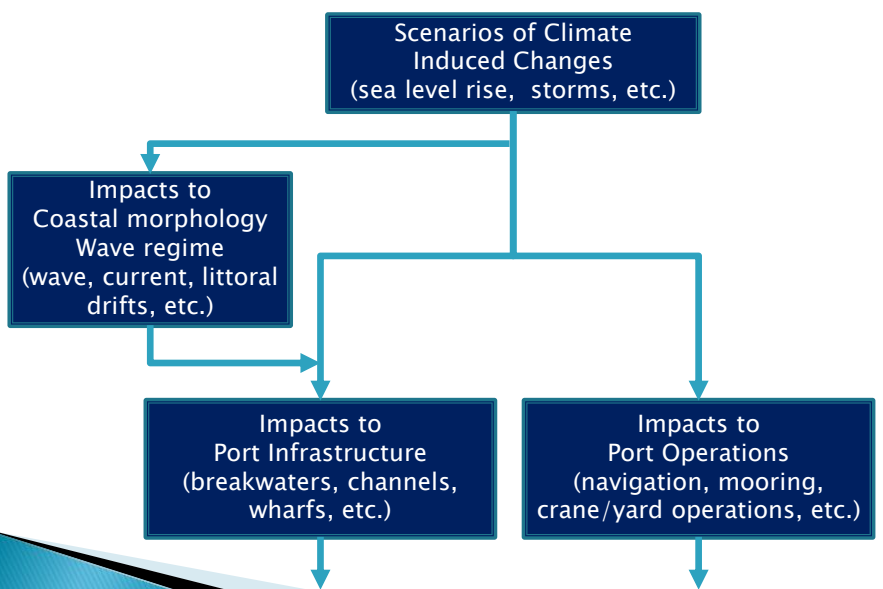
Adaptation: fundamental differences from traditional port planning & development

- Long time span for planning
  - Port planning & implementation --- 10~20 years
  - Climate change impacts and adaptation planning --- decades or 100 years
    - Cost-benefit analysis doesn't work for climate adaptation.
    - Minor adjustment approach with master planning doesn't work for climate adaptation.
- Slow and uncertain speed of changes
  - Change speed of economic factors --- months ~ years
  - Climate change impacts --- 1~3 mm/year (global sea level rise)
    - Too gradual to be effectively accommodated unless a fixed goal is given.
    - Longer periods of mismatch between design load and actual load.
- Changes of "unchanged" conditions
  - For port engineering, natural conditions (wave, sea-level, wind, tide, etc.) are assumed unchanged, though with daily & seasonal changes.
  - Thus, they are treated as statistically estimable for master planning.
    - Yet, too much uncertainty in climate change predictions for any localized coastal area at given point of time.
    - Even if predicted, future changes in natural conditions need to be estimated based on analysis of the complex coastal system around a port.

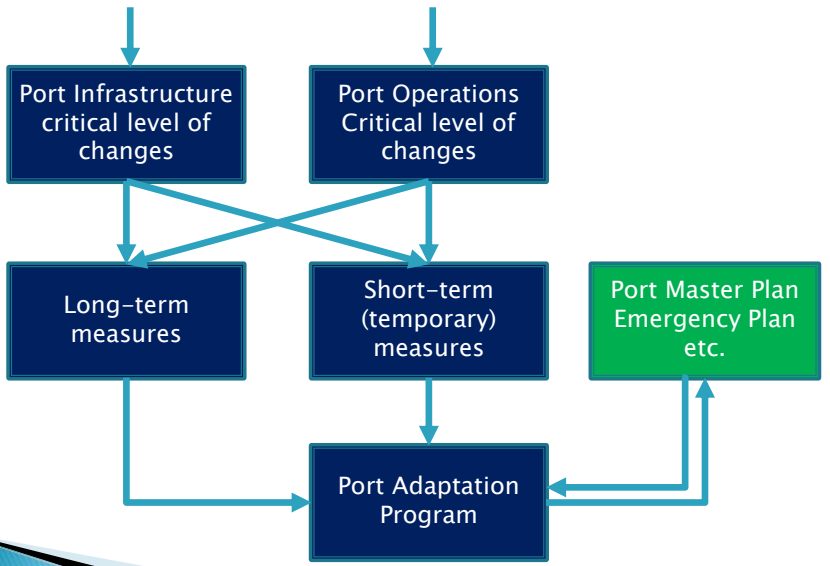
Climate proofing a port

- **Uncertainty in localized predictions of changes**
  - **Incremental planning rather than master planning**
  - **Scenario-based vulnerability assessment and programming**
- Slow, gradual and endless process of changes
  - Inevitably prolonged period of mismatch
  - Importance of "temporary measures" for adaptation
- Adaptation projects of no immediate returns
  - Cost-benefit analysis doesn't work
  - Incorporate adaptation measures in port projects of immediate needs

Scenario & Vulnerability Assessment



Assessment & Programming



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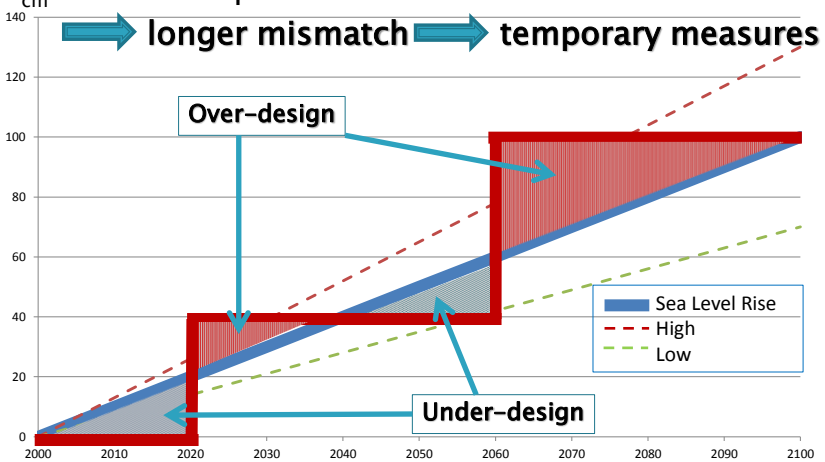
Prolonged period of mismatch

Case: adaptation measures for sea level rise

longer mismatch → **temporary measures**



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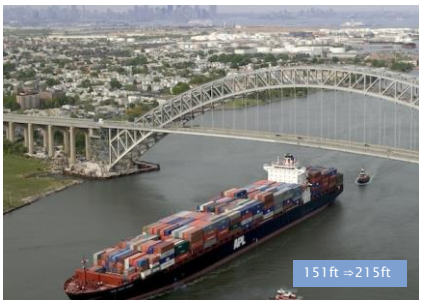
Opportunities for port adaptation

- Ports are aging, physically or functionally.
  - Design life (yrs.): breakwaters (60-100), berth facilities (30-45), cranes (15-20)
  - Re-construction takes a longer time due to working without disrupting port operations.

Ohi Terminal, Tokyo, opened in 1970s, was reconstructed to deepen its water-depth alongside from 13m to 15m.

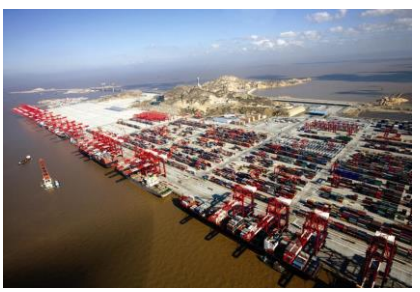


Bayonne Bridge, NYNJ, 80 years old, is now planned to raise by 64ft to allow 7,000 teu or larger container ships to pass under.

Opportunities for port adaptation

- Ports are growing.
  - Ports are developed to handle ever-increasing cargo volume as well as larger ships.
  - Terminals are expanding their capacity and productivity with innovative operations systems.

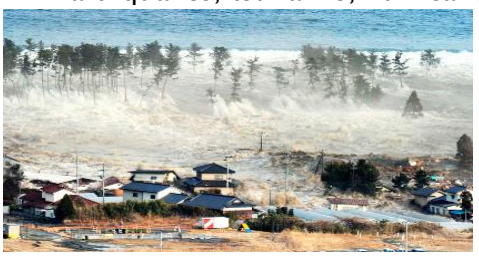
Jade Weser, Wilhelmshaven, opened in 2012 as the 1st deep-water container terminal in Germany, which has a natural depth of 18m.



Yangshan deep-water port, Shanghai, is developed with 30 container berths for main trunk lines calling Shanghai Port.

Opportunities for port adaptation

- Ports are always under the threats of natural disasters
  - Earthquakes, tsunamis, hurricanes, high waves, …..



3.11East Japan Earthquake & Tsunami devastated 15 major ports, disrupting distribution systems of the region as well as global supply chains.

Be ready for port adaptation

- **Identify critical vulnerabilities and develop action program**
  - Cyclic process of vulnerability assessment, adaptation planning & action program
- **Intensify monitoring of coastal conditions**
  - Urgent need for cost-effective monitoring system of local coastal areas (eg. remote sensing system via satellite)
  - International/regional sharing of coastal observation data and estimated changes
- **Develop effective temporary measures for adaptation**
  - Testing and improving temporary facilities/equipment to cope with longer periods of "over-design" and "under-design"
  - Design allowance for retro-fitting and/or flexible facility use

Joint efforts for port adaptation

- Increase **awareness** of critical need for port adaptation
- Set up an **international forum** to share experiences of port adaptation.
- Conduct **case studies** worldwide to gain practical know-how and provide showcases.
- Promote development of **new technologies and systems** for port adaptation.
- Press multi/bilateral financing agencies to build in **adaptation as part of port projects.**

Thank you for your attention

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