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“Climate Change Impacts and Adaptation for Coastal Transport Infrastructure in Caribbean SIDS”

Climate risk assessments and the business case for adaptation in ports

By

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Study aims

- Inter-American Development Bank (IDB) and Integral Port Administration of Manzanillo, S.A. de C.V. (API Manzanillo) Technical Cooperation to:
 - Evaluate **risks related to climate and oceanographic conditions** for Port of Manzanillo
 - Identify **opportunities** from early action and adaptation responses
 - Develop **Climate Change Adaptation Plan**
 - **Build capacity** among port stakeholders

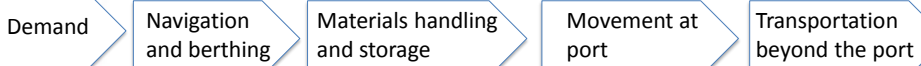


Overview of approach



Aspects of Port of Manzanillo value chain evaluated in the study

- Risk-based decision-making on adaptation
- Assess whole value chain
- Financial analysis of current and future climate-related risks
- Cost-effectiveness analysis and cost-benefit analysis of adaptation measures
- Development of **adaptation plan** and **adaptation pathways**
- **Mainstreaming** of adaptation measures into port plans



Climate-related risks with highest financial impacts for whole port

1. Increased **surface water flooding** of port entrance/access road
2. Increased **sedimentation** of port basin
3. Impacts of climate change on **global economy**, which could affect **trade** through the port

If no action is taken

**Financial impacts will be borne by both
API Manzanillo and the terminals**
But no risks identified affecting long-term
continuity of business



Surface water flooding causes damage to port infrastructure

- 6 million MXN in maintenance costs for roads/customs area in 2015 due to flood damage
- More frequent / intense flooding events = greater damage
- Extra 3 million MXN per year for maintaining internal roads/customs area by 2050



Manzanillo post Hurricane Jova 2011. (Source: API Manzanillo).

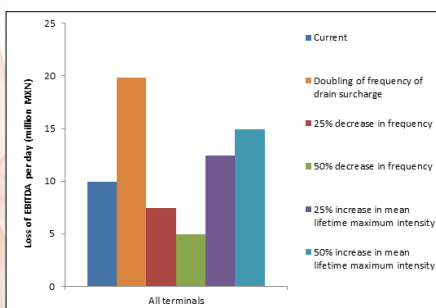


Clearing mangrove channel post Hurricane Bud 2012. (Source: API Manzanillo).



Surface water flooding causes disruption to port operations

- Average present-day downtime across all terminals is 1 to 2 days per year, every other year
- Equates to average annual loss of EBITDA of 10 million MXN
- Sensitivity analysis shows effect of:
 - Doubling of frequency of drain surcharge
 - Four other changing storm scenarios



Average annual loss of EBITDA across all terminals due to surface flooding of port access road, under various flooding scenarios

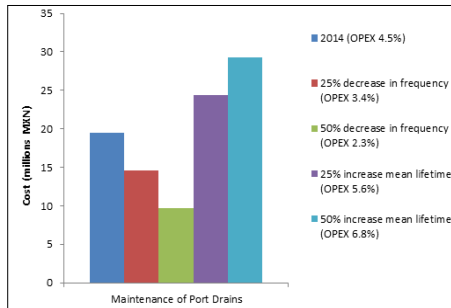
(Source: Report authors)



Increased sedimentation leads to higher maintenance costs

Maintenance of drains

- 2014 costs: 19.5 million MXN (4.5% of API Manzanillo's total OPEX)
- Increase in sediment deposition by 2050: Additional 1.6 million MXN per year
- OPEX under changing storm scenarios in range 2.3% to 6.8%



Sensitivity tests for changing drain maintenance costs. (Source: Report authors)

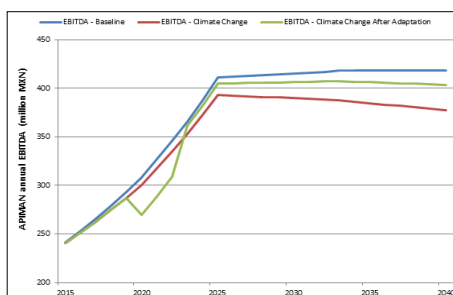
Maintenance dredging

- 2014 costs: 54 million MXN
- Increase in sedimentation by 2050: Additional 900,000 MXN per year
- Mean SLR would reduce costs by between 90,000 and 110,000 MXN per year



Financial analysis - upgrade of drainage system

- Upgrading maximum capacity of drainage system and installing additional sediment traps will reduce surface water flooding and sedimentation
- Assess combined financial performance of two adaptation measures:
 - **Increase capacity of Drain 3** – estimated cost 93 million MXN
 - **Install additional sediment traps** in all drains – estimated costs 7 million MXN



Effects of drainage-related climate change impacts and upgrades to drainage system on API Manzanillo's annual EBITDA (2015 MXN) (Source: Report authors).

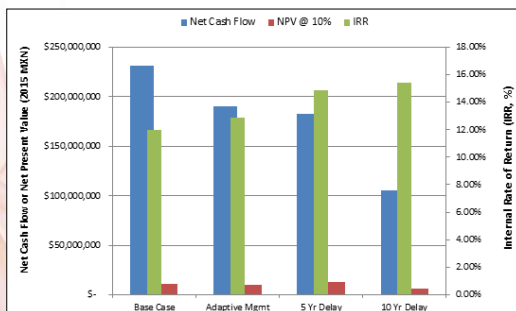
Blue line: Ignoring the effects of climate change

Red line: With climate change impacts; no adaptation

Green line: With climate change impacts and adaptation

Performance of adaptation implementation scenarios

- Drainage system investments are financially worthwhile
- Costs of implementation not large compared to API Manzanillo's overall annual OPEX
- **Implementation scenarios where investments are delayed – lowers net cash flow (leaves port exposed to climate impacts for longer) but improves rate of return on investment**



Comparison of financial performance of adaptation implementation scenarios for upgrades to drainage system.
(Source: Report authors)



Action at the port following the study: Mainstreaming

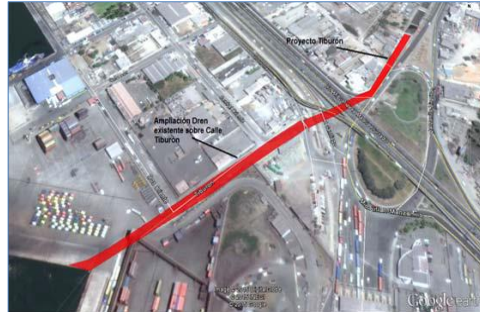
- **Mainstream climate change risk and adaptation in the new Master Plan for Port Development**

*"The Port of Manzanillo could see its financial situation strengthened with the benefits of conserving natural resources, promoting the use of environmentally friendly goods and services, as well as the use of advanced technologies, high energy efficiency and low or no generation of pollutants or greenhouse gases. At the same time, by supporting public policies in the seas and coasts with specific actions, economic opportunities would be promoted at the port, competitiveness would be fostered and the **necessary coordination would be encouraged to face the effects of climate change.**"*



Action at the port following the study: Drainage system

- Plan for extension of drainage system (Drain 3)
- Construction timeline: May – Dec 2017
- Investment: 60m MXN



Reflections of API Manzanillo team



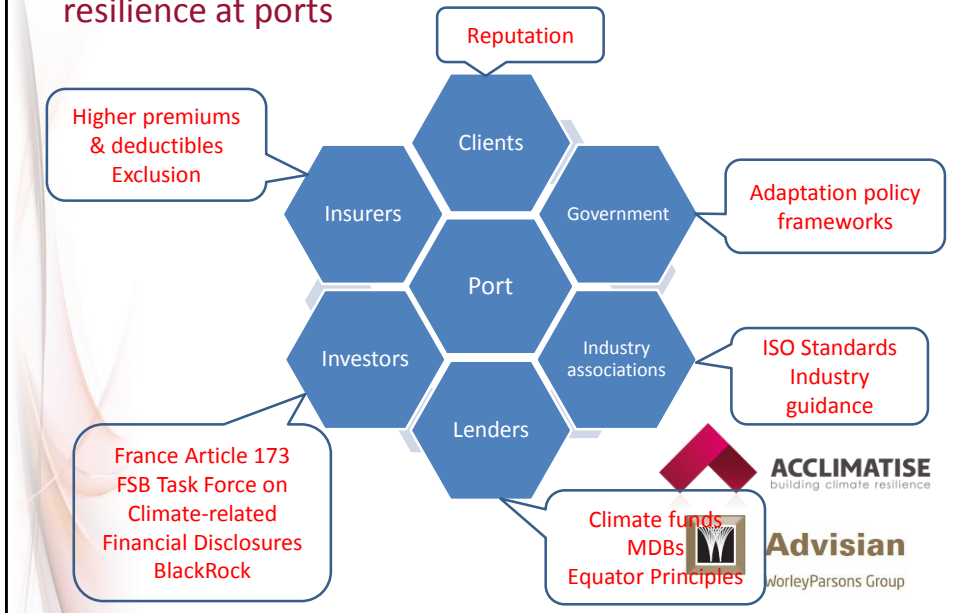
Technical Cooperation with IDB has led to internal change

Now planning with a different vision, trying to ensure proposed works incorporate climate change considerations

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The wider business case for climate resilience at ports



Thank you

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