The Commercial Law Development Program
Presents
Public-Private Partnerships (PPP) Webinar Series

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PPP and Climate Risks (Part 2)

Today's Presenters

Jill Jamieson
CEO Illuminati Infrastructure
Distinguished Senior Fellow at Global Resilience Institute

Amit Bando
Managing Partner, Clean Infrastructure Development BSA - Strategic Advisory Services, LLC

Alec Bogdanoff, Ph.D
Principal and Co-Founder
Brizaga

Today's Agenda

- Introduction
- Tools for Decision Makers – Overview
- Case Studies
- Discussion

Introduction

Natural disasters and climate change can impose negative impacts on government, private sector parties, and end users

- Asset damage and deterioration and reduced asset life,
- Increases in operating costs and the need for additional capital expenditure,
- Disruption to service provision,
- Business interruption / Loss of income,
- Increased risks of environmental damage and litigation,
- Changes in market demand for services,
- Increased insurance premiums or lack of insurance availability; and
- Financial market and viability distress.

Including climate resilience in projects can also ensure funding for future projects

Flooding: *Example feedback loop for local governments where property taxes are a primary source of revenue.*

- ***Two perspectives:***
  - How climate risk and resiliency impacts PPP agreements (regardless of the asset)
  - The use of PPP arrangements to deliver resilience infrastructure (i.e., flood protection, etc.)

- ***Key considerations:***
  - Risk allocation and value-for-money
  - Resiliency standards and metrics
  - Financial viability

Why Consider Climate Risks in PPPs?

- To successfully manage risks in PPP, relevant disaster risks must be thoroughly assessed, contractually allocated, and effectively managed

- Given the contractual nature of PPP, must establish common definitions of and metrics for risks and potential disaster events

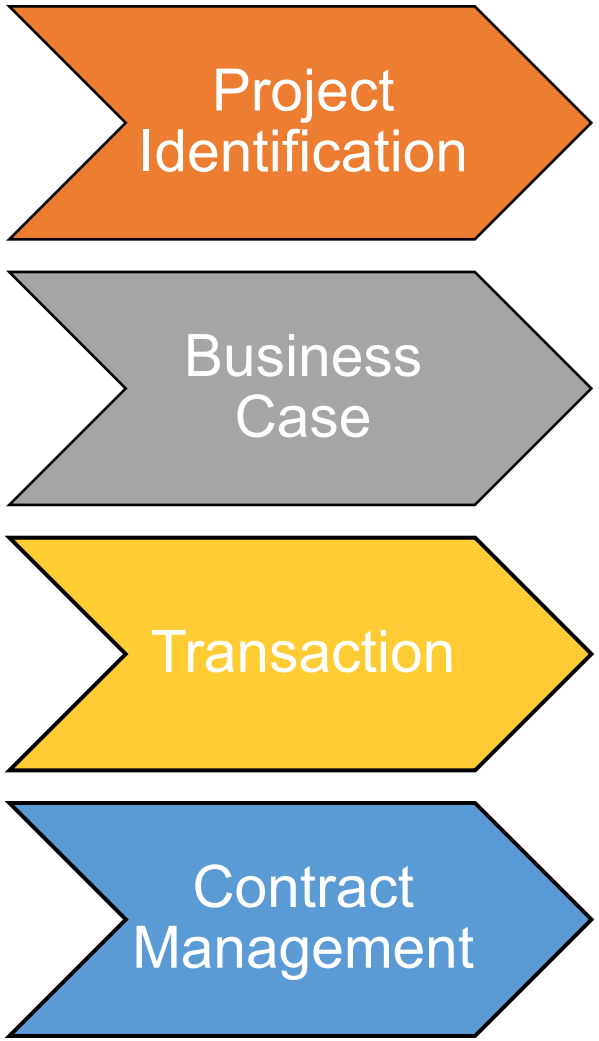
- This includes establishing clear definitions for 'force majeure' events—unexpected events beyond the control of government or the operator that prevent either party from complying with its obligations.

Why Consider Climate Risks in PPPs?

- Consider life-cycle costs – long term costs of infrastructure assets
  - Private investors have to design projects that are more able to withstand climate events.
- Offer innovative solutions
  - Coordination among several stakeholders – e.g., government, developers, financial investors, and operators.
- Include lenders' due diligence

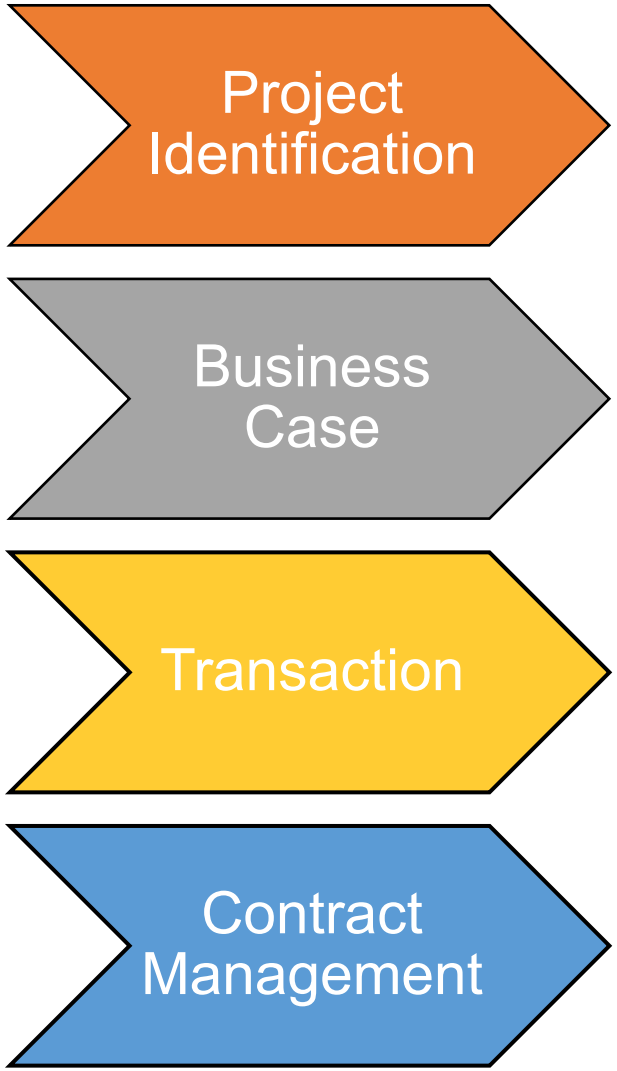
Tools for Decision Makers - Overview

Embed Climate Risk in Project Identification



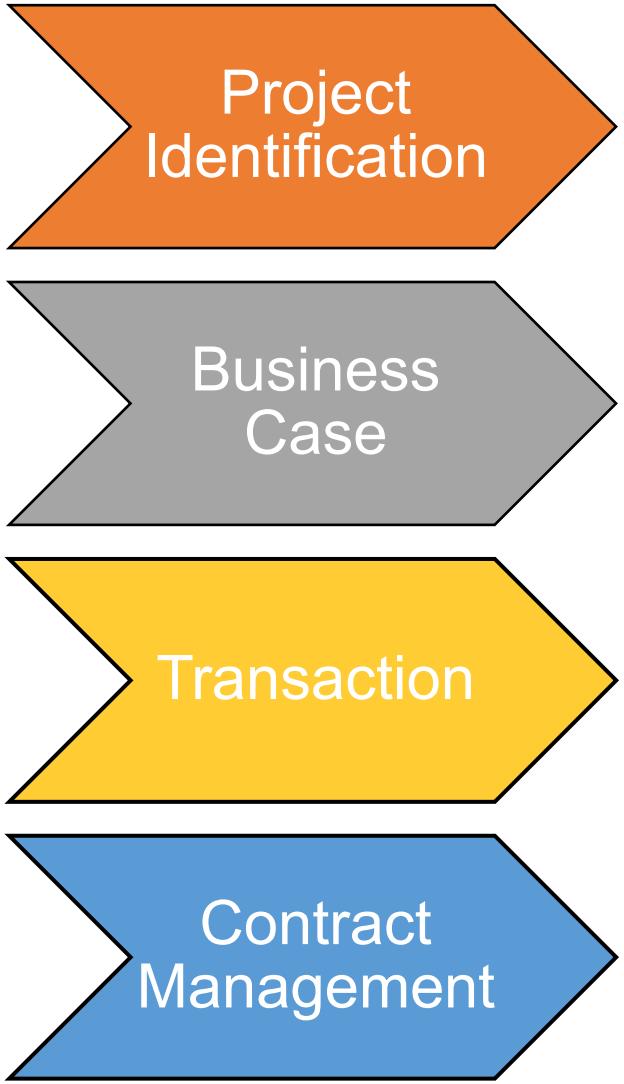
- Screening level assessment of climate risk exposure.
- Screening level assessment of project vulnerability.
- Screening level assessment of the overall climate risk profile.

Embed Climate Risk in Business Case



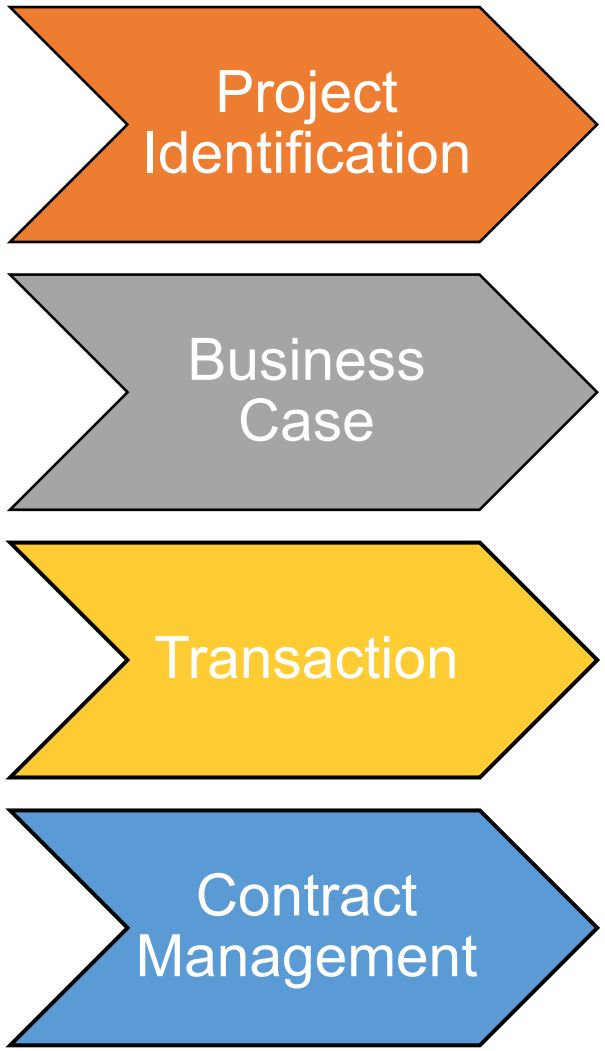
- Comprehensive assessment of climate risk exposure.
- Comprehensive assessment of project vulnerability.
- Comprehensive assessment of overall climate risk profile.
- Embed resilience in cost estimates.
- Risk valuation methods - include climate risk in:
  - Cost benefit analysis.
  - Financial feasibility.
  - Value for money.
  - Environmental impact assessment.

Embed Climate Risk in Transactions



- Include climate resilience/risks in ‘request for qualifications’.
- Use high-level decision framework to include climate resilience/risks in PPP contracts.
- Integrate climate resilience into PPP output specifications decision framework.
- Require ‘disaster response plans’.
- Embed climate resilience/risks into PPP evaluation.
- Require periodic update of climate risk mitigation plan.
- Enforce climate risk mitigation plans through payment mechanism.
  - Potential for concessional financing options.
  - Potential for innovative funding mechanisms.
  - Potential for innovative financing mechanisms.

Embed Climate Risks in Contract Management



- Simplified change regime.
- Define force majeure.
- Use sample language for un-insurability.

Case Studies

Leveraging PPP to Deliver Resilience Infrastructure

- Use of PPP for resilience infrastructure (such as flood protection) is growing on a global scale.
- United States $2.75 billion Fargo Moorhead Diversion DBFOM PPP – 30 mile long Diversion Channel and river control structures, a first for PPP in flood resilience in the U.S. points to a new way of combining public and private capital to mitigate the effects of climate change.
- Netherlands Flood Defense PPP – to protect the Netherlands against rising sea and inland water levels. Project involves the upgrade of the 32km long Afsluitdijk dyke, which currently does not meet the requirements for safety against flooding. The project is being delivered as a design-build-finance-maintain (DBFM) public-private partnership (PPP).

Fargo-Moorhead Flood Mitigation

- **Metro Flood Diversion Authority** created in 2016 – funded by voter approved sales taxes.
- The U.S. Army Corps of Engineers is looking at PPPs to revolutionize how they construct large projects.
- This is the first ever PPP for flood mitigation in the U.S. – $2.8 billion project.
- Expected to cost $330 million less and be completed **10 years sooner** than if it were delivered by the Army Corps standard design-bid-build process.

Diverse Approaches

Role of IE in Assessing Damage Loss Responsibility: Samakhiali-Gandhidham Toll Road in India

At the start of operations in 2015, the Samakhiali-Gandhidham Toll Road Project in India suffered revenue losses worth US$68,000 and toll plaza damages worth US$400,000. The damages were due to severe rainfall and flooding at the project site that led to closure of the toll plaza for more than 24 hours, thereby preventing toll collection.

Although the concessionaire invoked the force majeure clause, the IE reviewed the incident and determined that the damages and losses associated with the disaster resulted from the concessionaire's operational inefficiency. Specifically, the concessionaire had failed to follow the IE's earlier suggestion to upgrade facilities before the start of the monsoon season. Therefore, the authority did not provide a contract period extension, and the private developer bore the revenue losses.

Insurance Requirements in Kenya PPP Contract

Disaster risk insurance is available in Kenya to cover risks of drought and flood, among other natural hazards, in infrastructure PPP contracts. Government has implemented requirements for mandatory disaster risk insurance coverage. As extracted from a sample power purchase agreement (PPA), for example, the seller (the project company) shall "at its sole cost and expense, obtain and maintain, in full force and effect, for the periods specified in Schedule 8, the insurance policies set forth in Schedule 8, in the amounts stipulated (provided that, having regard to the level of cover generally taken out by international independent geothermal power producers acting in accordance with Prudent Operating Practice, such insurances are available on commercially reasonable terms), with reputable insurance companies. Notwithstanding the foregoing, the Parties agree that Schedule 8 sets forth minimum requirements and that the foregoing, therefore, shall not preclude the Seller from increasing the amount of coverage obtained under any type of insurance coverage referred to in Schedule 8."

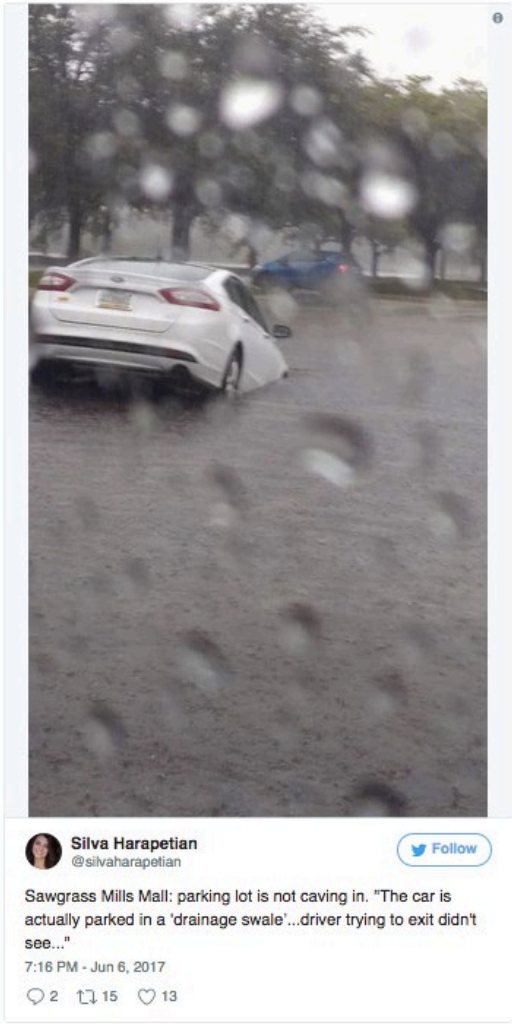
PPIAF offers an extensive data base of additional case studies

Financing Considerations

- Climate resilience is likely a pre-requisite to attract international investment into large PPP.
- In recent years, financial regulators around the world have explored or instituted a variety of measures to better safeguard their financial systems against climate-related risks.
  - These include the development of climate scenarios to assist in risk management and, in some jurisdictions, the application of climate scenario analyses for bank and insurance company balance sheets.
  - For example, the Bank of France, European Central Bank, Bank of England, Australian Prudential Regulation Authority, and the Nederlandsche Bank have completed or are in the process of launching climate risk assessments for non-financial companies, banks and/or insurance companies.
  - Financial regulators around the world have also taken steps to encourage the incorporation of climate-related risk management into the roles and responsibilities of corporate boards, including for financial institutions.
  - Climate-related financial disclosure requirements being implemented in some jurisdictions.
- Financial viability of PPP accounts for climate resilience.

Insurance Concerns: Sawgrass Mills Shopping Mall

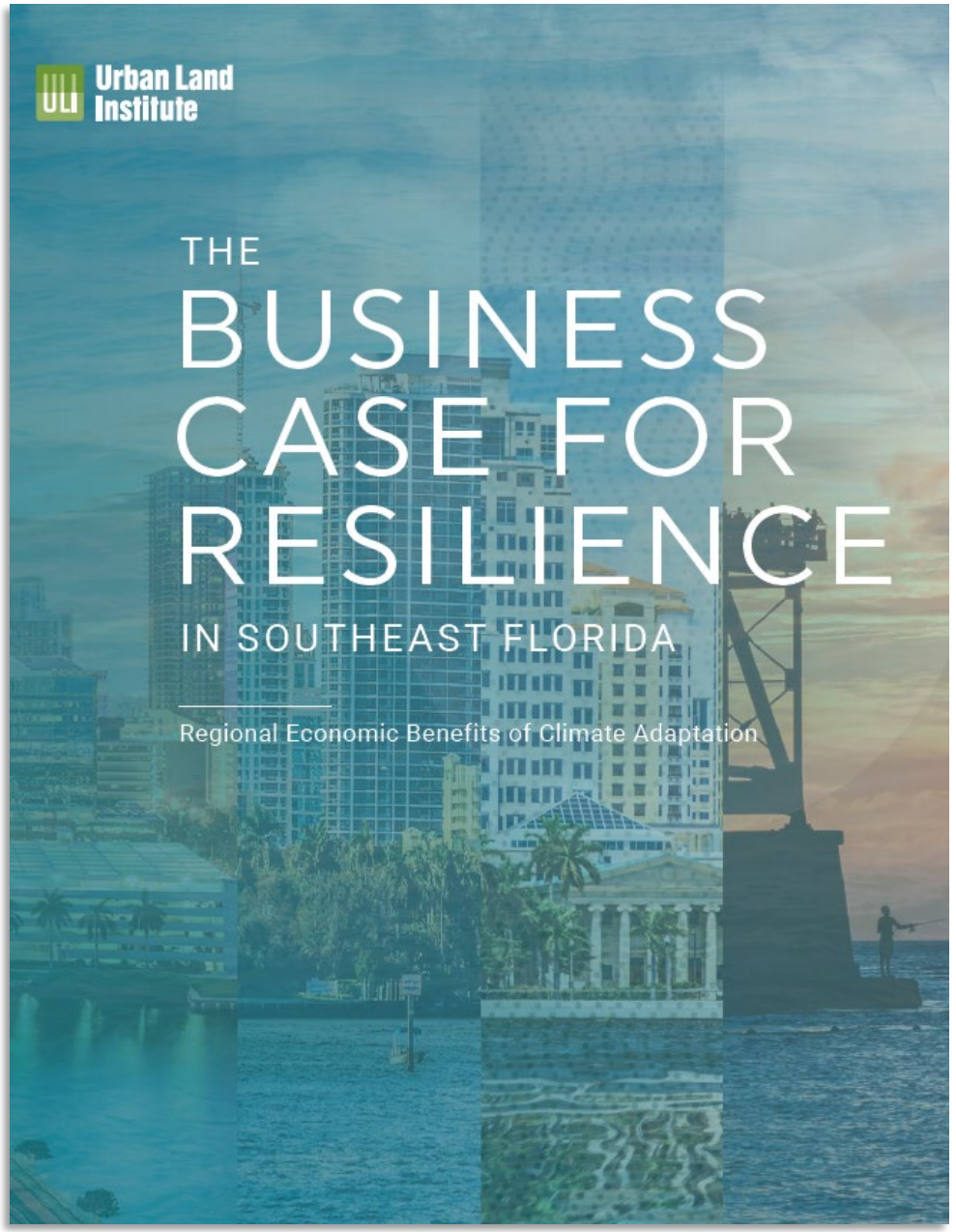
- Sunrise, Florida (northwest of Miami)
- 15” of rain in 3 days, with most in 24 hours
- Mall closed for 3 days due to flooding in parking lot
- Approximately $4 million in lost revenue per day (based on company-wide numbers) → sales tax loss



The Business Case for Resilience in Southeast Florida

Understanding how one of the most visible signs of climate change will impact a global economic center, and how to address those impacts.

Where will the funding come from?



Study Process

1

Identify Vulnerabilities

Gather existing data and analyze future coastal conditions to identify impacted areas.

2

Determine Costs + Benefits

Calculate avoided damages (i.e., benefits) and costs of proposed adaptation strategies. Identify co-benefits of proposed strategies.

3

Recommend Immediate Steps

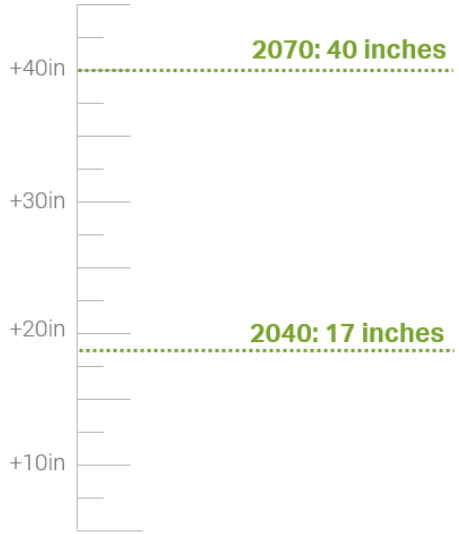
Develop recommendations to advance investment in resilient institutions, infrastructure, and economies.

***Note**: This study represents a high-level regional analysis, leveraging readily available and regionally standardized physical and economic data, replicable analysis techniques, and generalized assumptions.*

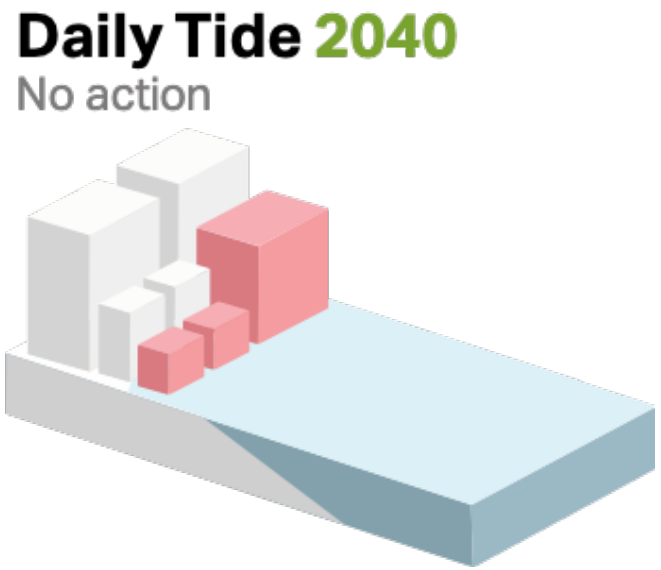
Why Higher Frequency Flooding?

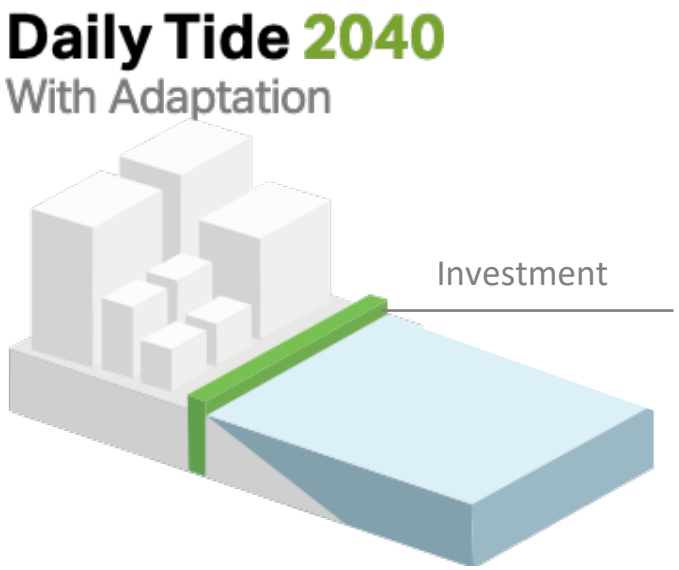
This study examines flooding that occurs often and is not associated with large catastrophic events.

- This study examines events that occur frequently, where the economic implications are not readily understood.
- Adaptation can reduce flooding from higher frequency events.
- These events will get noticeably worse as sea levels rise.



Understanding Flood Events and Adaptation





Examined: Daily Tide, 1-Year Tide (King Tide), and 10-Year Storm Tide

Key Terms

- ***Mean Higher High Water:*** Average of the highest of the two high tides occurring each day. Referred to in this study also as daily inundation.
- ***1-Year Tide:*** The annual highest tide, also referred to as the King Tide.
- ***10-Year Storm Tide:*** A tide with a 10% chance of occurring in any given year. This event represents high frequency conditions of temporarily elevated water levels due to coastal storms.

2 Calculating Avoided Damages

Impacts were modeled for parcels where

25%

or more of the parcel footprint is exposed to the modeled coastal conditions.

	Temporary Storm Damages	Permanent Damages from Rising Sea Levels
	**Direct Property Impacts** • Structure and content damages • Relocation costs	**Direct Property Impacts** • Property value loss
	**Business and Employment Impacts** • Sales output loss • Income loss • Job impacts	**Business and Employment Impacts** • Sales output loss • Income loss • Job impacts
	**Fiscal Impacts** • Sales tax loss • Tourist development tax loss	**Fiscal Impacts** • Property tax loss • Sales tax loss • Tourist development tax loss

2

2040 Highlight of Avoided Damages

	Temporary Storm Damages	Permanent Damages from Rising Sea Levels
Direct Property Impacts	**$3.2bil** In structure and content losses from one **10-year tide** event under 2040 conditions.	**$4.2bil** In property value exposed to **daily tidal inundation** in 2040.
Business and Employment Impacts	**360 jobs** Impacted by a **10-year tide** in 2040.	**720 jobs** Impacted by **daily tidal inundation** in 2040.
Fiscal Impacts	**$2mil** Sales & tourism tax losses from **10-year tide** in 2040.	**$28mil** Fiscal loss from **daily tidal inundation** in 2040.

**Results shown here are not adjusted to account for financial discounting. Parcels impacted by daily tidal inundation are excluded from the 10-year tide damages. The 10-year tide results account for the impacts of one storm event and are not adjusted for probability of the storm event occurring.*

2070 Highlight of Avoided Damages

Temporary Storm Damages

Permanent Damages from Rising Sea Levels

Direct Property Impacts

$16.5bil

In structure and content losses from one **10-year tide** event under 2070 conditions.

$53.6bil

In property value exposed to **daily tidal inundation** in 2070.

Business and Employment Impacts

1,300 jobs

Impacted by a **10-year tide** in 2070.

17,800 jobs

Impacted by **daily tidal inundation** in 2070.

Fiscal Impacts

$8mil

Sales & tourism tax losses from **10-year tide** in 2070.

$384mil

Fiscal loss from **daily tidal inundation** in 2070.

**Results shown here are not adjusted to account for financial discounting. Parcels impacted by daily tidal inundation are excluded from the 10-year tide damages. The 10-year tide results account for the impacts of one storm event and are not adjusted for probability of the storm event occurring.*

Community-wide Adaptation

A combination of soft and hard engineering investments at the open coast, intracoastal, and inland areas.

Building-level Adaptation

A combination of structural improvements to property itself.

Note: Building-level adaptation will not provide benefit to regional infrastructure or to coastal resources such as beaches.

Building-Level Adaptation

	CUMULATIVE IMPACTS AVOIDED	CUMULATIVE ADAPTATION COSTS	NET IMPACTS	BENEFIT-COST RATIO
BROWARD	$4.5 billion	$1.5 billion	$3 billion	3.04
MIAMI-DADE	$9.2 billion	$1.8 billion	$7.5 billion	5.18
MONROE	$459 million	$598 million	-$139 million	0.77
PALM BEACH	$3.3 billion	$545 million	$2.8 billion	6.08

FOR THE REGION

Benefits **$17.6BIL** ÷ Costs **$4.4BIL** = Benefit-Cost Ratio **3.97**

Job Years Supported **56,000**

One Job  x *Ten Years*  = *Ten Job Years* **10**

*Results presented in net present value terms using a 5 percent discount rate over the period of analysis from 2020 to 2070

**Presented in terms of job years. Job years is equivalent to one year of work for one person; for example, a new construction job that lasts two years will equate to two job years. Estimated job years supported due to direct investment spending in the four counties of analysis

Community-Wide Adaptation

	CUMULATIVE IMPACTS AVOIDED	CUMULATIVE ADAPTATION COSTS	NET BENEFITS	BENEFIT-COST RATIO
BROWARD	$9.601 billion	$4.128 billion	$5.473 billion	2.33
MIAMI-DADE	$19.461 billion	$2.101 billion	$17.360 billion	9.26
MONROE	$3.182 million	$7.669 billion	-$4.487 billion	0.41
PALM BEACH	$5.613 billion	$4.325 billion	$1.288 billion	1.30

FOR THE REGION	Benefits		Costs		Benefit-Cost Ratio	Job Years Supported
	$37.9BIL	÷	$18.2BIL	=	2.08	85,000

One Job x *Ten Years* = *Ten Job Years* **10**

*Results presented in net present value terms using a 5 percent discount rate over the period of analysis from 2020 to 2070

**Presented in terms of job years. Job years is equivalent to one year of work for one person; for example, a new construction job that lasts two years will equate to two job years. Estimated job years supported due to direct investment spending in the four counties of analysis

The public and private need for investment.

- The region was able to show that investments are needed and are cost-beneficial.
- There will be a need for coordinated public and private investment – PPPs will be be helpful here.
- Considering policy changes that encourage private sector investment for public infrastructure needs.

Flooding events will become far more frequent

Less frequent events become more frequent as sea levels rise.

Year	SLR (feet)	Tide Level Relative to NAVD88 (feet)			
		Permanent Inundation	Highest King Tides	10-year Storm	100-year Storm
2020	**+0.6**	1.5	2.4	4.2	6.3
2030	**+1.0**	1.9	2.8	4.6	6.7
2040	**+1.4**	2.3	3.2	4.9	7.1
2045	**+1.7**	2.5	3.5	5.2	7.4
2050	**+2.0**	2.8	3.7	5.5	7.7
2060	**+2.6**	3.5	4.4	6.2	8.3
2070	**+3.4**	4.2	5.1	6.9	9.1

Discussion

What about negative externalities?

If property rights cannot be established, such as with the air, sea, or roads, then the only two options are:

(1) We *learn to live* with externalities, or:

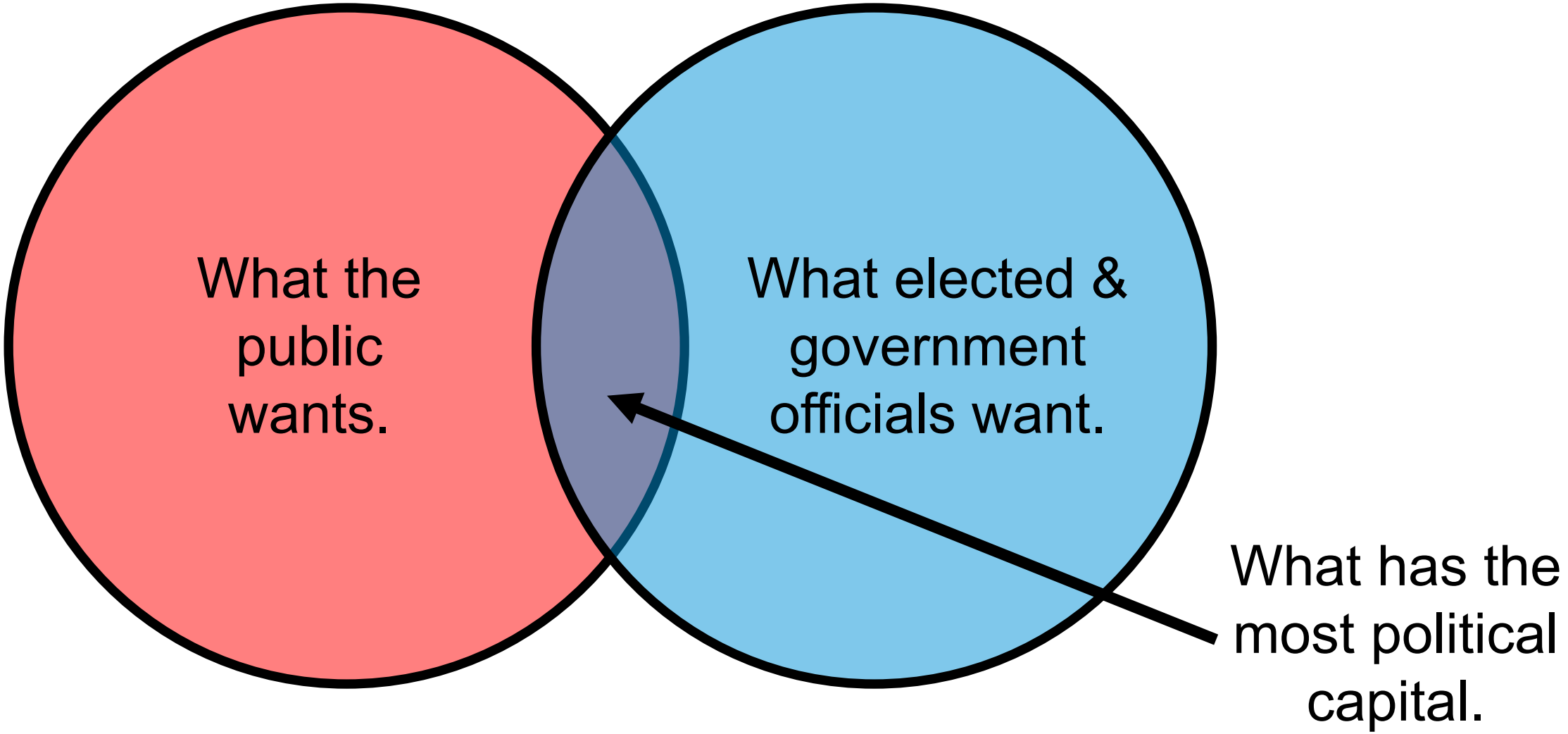
(2) Government *intervenes* on our behalf through taxes or direct controls and regulations, such as:

- Some countries have embedded disaster resilience in their PPP legal framework by **Taxing** polluters, such as carbon taxes, or taxes on plastic bags.
- Incentives in PPP contracts and bidding documents for climate-friendly aspects - Subsidizing households or firms to be non-polluters, such as giving grants for home insulation improvements.
- Selling **permits to pollute or carbon credits**, which may become traded by the polluters.
- Forcing polluters to pay compensation to those who suffer, such as making noise polluting airports pay for double-glazing.
- **Road pricing** schemes, such as the Electronic Road Pricing (ERP) system in Singapore, which is a pay-as-you-go, card-based, road-pricing scheme.
- Providing more information to consumers and producers, such as requiring that tickets to travel on polluting forms of transport, especially air travel, should contain information on how much CO_2 pollution will be created from each journey.
- The adoption of policies emerging from research by **behavioural economists** - often shortened to 'nudge' theory. This type of approach looks at influencing choices individuals make by nudging them towards more effective **decison making**.

A comment regarding social equity

- Often property value and socioeconomics play a strong role in the financial viability or prioritization of a project.
- Consider additional factors such as the number of people protected and secondary economic factors, such as workforce disruption

Where to Start? Bridging the Gap



Summary and Conclusions

- Consider both how climate change will impact potential PPPs, and how we can address climate change and the impacts using PPPs.
- Proper planning is essential – how will government consider risk as part of the overall financing strategy?
- Our assumptions are often based on stationarity (or things remaining the same), but climate change will challenge that notion.

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Tel: +1 202 482 2400

1401 Constitution Avenue,
NW, Washington,
DC 20230

www.cldp.doc.gov

Shane Meckler
Attorney-Advisor
Indo-Pacific Portfolio
Smeckler@doc.gov

Mohammed Loraoui
Attorney-Advisor
Power Africa Portfolio
Mloraoui@doc.gov