Abt ASSOCIATES
BOLD THINKERS DRIVING REAL-WORLD IMPACT

UN CLIMATE CHANGE CONFERENCE UK 2021
IN PARTNERSHIP WITH ITALY

Using Tools to Design and Evaluate Climate Actions

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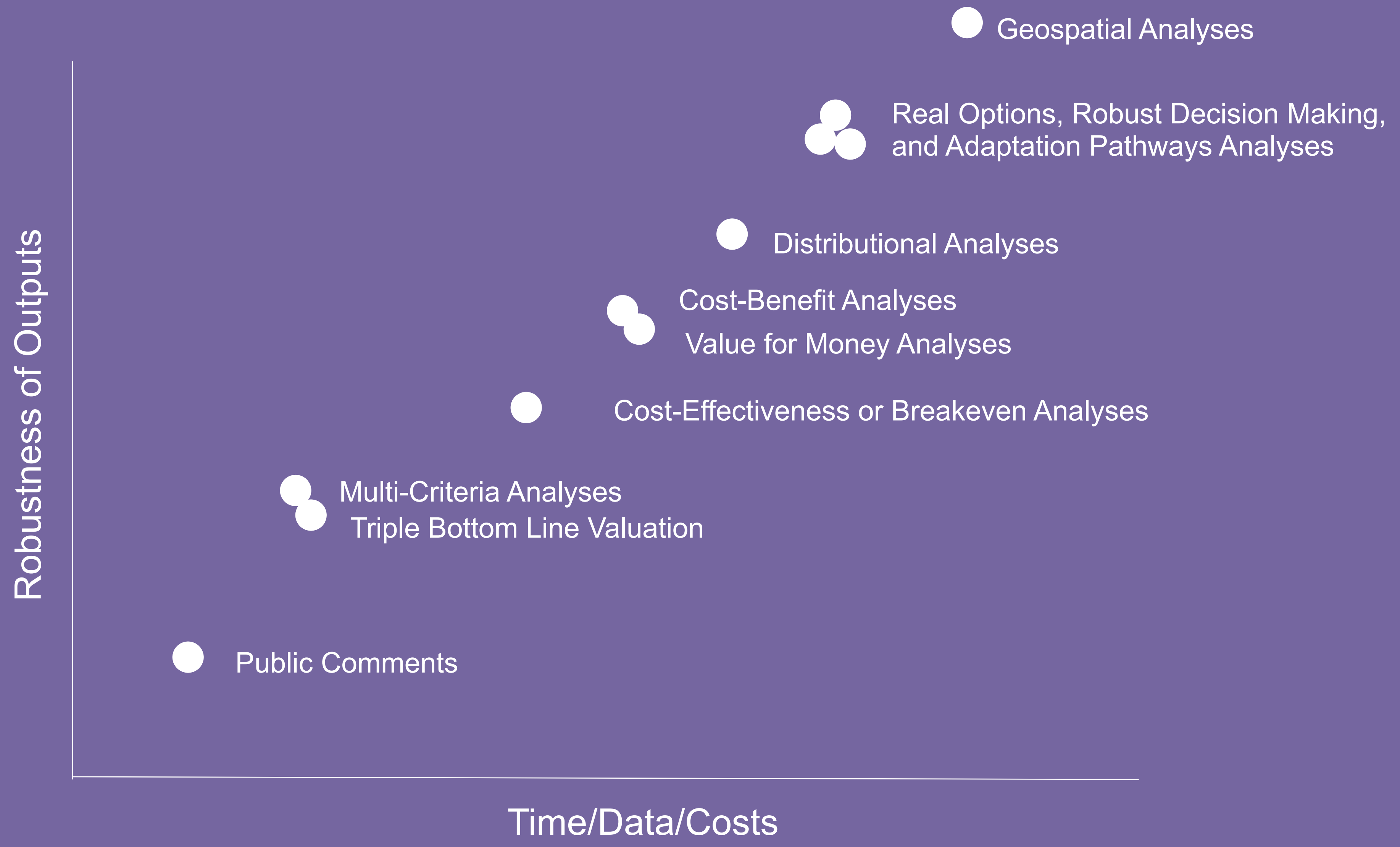
COP26 Capacity Building Hub

The Value of Data and Tools

- Using GEN's participatory approach, we've developed several ideas for climate actions. **But what comes next?**
- Key Questions asked at this stage include:
    - How do I show other stakeholders the value of these actions and attract funding?
    - How do I assess uncertainties and tradeoffs among actions?
- Using **data-driven tools,** we can
    - evaluate, compare, or prioritize identified actions
    - build consensus about problems, objectives, and priorities

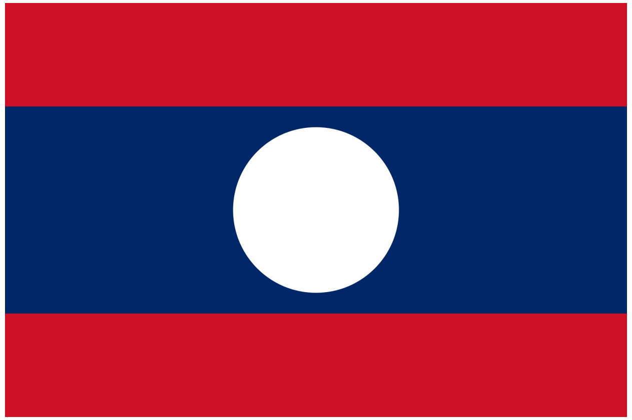
Decision Support Tools
Time/Data Needs v. Robustness of Output



Decision Support Tools

- As we saw on the previous slide, several tools exist that can help answer our key questions, each with different data and time intensity requirements
- Today we want to explore two of these tools:
    - **Multi-Criteria Analysis** – evaluate actions based on multiple priority factors or criteria. Can be completed using qualitative or quantitative data.
    - **Cost-Benefit Analysis** – evaluates actions based on the potential rewards (i.e., financial revenues, social or environmental benefits) and costs associated with an action.

Resilience Action Planning in the Power Sector in Lao People’s Democratic Republic



Population: 7.5 million

Electricity Access: 83% of population

Government Agencies/Utilities: Ministry of Energy and Mines, Électricité du Laos, and EDL-Generation Public Company.

Other Context:

Conducted a stakeholder-led vulnerability assessment

Identified and scored the highest risk vulnerabilities within the power sector

Resilience Strategies

Resilience Strategy (and resilience strategy number)		Specific Vulnerabilities Addressed[1]
R1	Establish protocol for data collection at all hydropower dams	V32
R2	Develop policy to improve communications and require data sharing between hydropower dam operators	V15, V32
R3	Improve ability to collect and make use of data (meteorological, hydrological, and climate change data)	V32
R4	Construct protection systems, underground lines, or redundant lines for important transmission and/or distribution lines and/or substations	V9 , V24
R5	Improve survey and spatial data on landslide-prone areas to support siting of distribution systems	V19
R6	Reforest landslide-prone areas near distribution systems	V19, V29

Multi-Criteria Analysis Case Study

Scoring and Evaluating Strategies

Resilience Strategy		Criteria				Priority Level
		Cost and/or Finance Availability	Implementation timing	Feasiblity (technical and political)	Effectiveness	
R1	Establish protocol for data collection at all hydropower dams*	**Good** Less than USD $500,000 in capital costs	**Good** Less than 2 years to complete	**Good** - Local staff have necessary expertise - Consistent with Lao PDR power development plan (PDP) and other policies	**Fair** Reduces significant risk for a vulnerability (approximately 50% reduction in risk)	**Implement**
R2	Develop policy to improve communications and require data sharing between hydropower dam operators	**Good** Less than USD $500,000 in capital costs	**Fair** 3 years for implementation	**Good** Local technical experts available	**Good** Reduces the bulk of risk for a vulnerability (greater than 70% reduction in risk)	**Implement**
R3	Improve ability to collect and make use of data (meteorological, hydrological, and climate change data)	**Fair** Between USD $500,000 and USD $1,000,000 in capital costs	**Fair** 3 years for implementation	**Fair** Local and Southeast Asian technical expertise	**Good** Reduces the bulk of risk for a vulnerability (greater than 70% reduction in risk)	**Evaluate**
R4	Construct protection systems, underground lines, or redundant lines for important transmission and/or distribution lines and/or substations	**Poor** Greater than USD $1,000,000 in capital costs	**Poor** More than 5 years to complete implementation	**Good** Local technical staff available	**Good** Reduces the bulk of risk for a vulnerability (greater than 70% reduction in risk)	**Evaluate**

Cost-Benefit Analysis of Mangrove Restoration in Quelimane, Mozambique

Two small communities: Icídua, Mirazane

Population: 9,084 in 1,817 households

Community context:

- Low-income
- Dependent on mangroves for fuel wood, construction poles, and food
- Typical houses are made of mangrove poles, rocks, and mud plaster, with a thatch roof and frequently no plumbing

Three CBA Scenarios

Without Project

- No planned coastal adaptation measures (business as usual)
- Assumes no additional adaptation measures implemented

Mangrove Restoration

- Replanting of mangrove seedlings on 22 ha of elevated riverbank
- Restoration site between river and existing infrastructure (houses, local dirt road, and structures)
- Site requires hydrological restoration to return natural inundation patterns

Grey Infrastructure

- 5,000-meter earthen dike around Icídua and Mirazane selected for further analysis
- 50-year expected life

Data Needs

Assumptions

- Time period: 50 years
- Discount rate: 12% real
- Prices: 2016 US dollars
- Exchange rate: 59 Meticais per USD
- Average value of Homes for avoided Damages[1]: $915

Costs per Hectare

- Hydrological restoration
  - *Labor: $141*
  - *Material and equipment: $232*
- Cost of buying and transporting seedlings and planting labor: $2,800
- Replacement of non-surviving seedlings: $369
- Transport costs for maintenance: $71

Financial Benefits

- Annual benefit from fish and shellfish production: $6,762/ha/y
- Storm protection: 7% of homes destroyed in medium and large storms
- Aquaculture: benefit transfer, $5.16/ha/y

[1] INGC (2009); [2] Rönnbäck (1999) ; [3] Tuah *et. al.*, 2013

Results

Net Present Value of Mangrove Restoration and Earthen Duke at 15% Discount Rate (USD per hectare)

Scenario	Mangrove Restoration	Earthen Dike
Financial NPV	$33,165	-$34,251
Economic NPV ($0 carbon price	$35,708	-$28,647
Economic NPV ($8 carbon price)	$153,575	-$28,647
Economic NPV ($15 carbon price)	$256,708	-$28,647
Economic NPV ($25 carbon price)	$404,041	-$28,647

Breakout Group Exercise

- In your groups, using the climate actions you developed with GEN, think through how you could use tools to analyze your options.
  - What types of data would you need?
  - Is it more qualitative or quantitative?
  - Is the data free and/or readily available?
  - Finally, based on the data that you have, what types of tools could you use to analyze options?

Thank you!

We are here to answer any questions and welcome your thoughts.

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Additional Slides

Stakeholder Led Resilience Planning Process

- First developed a broad list of resilience strategies to address one or more high risk vulnerabilities - similar to what we have just done with GEN
- Reviewed a set of evaluation criteria and associated thresholds that an advisory group had developed
- Scored each proposed resilience strategy using the criteria
- Evaluated the scores and assigned priority levels.
- Developed implementation actions plans for high-priority strategies

Evaluation Criteria and Scores

Criteria	Defined-Level Scores		
	Good	Fair	Poor
Cost and/or finance availability	- Less than U.S. Dollars (USD) $500,000 in capital costs, - Low operations and maintenance costs, and/or - Financing is readily available	- Between USD $500,000 and USD $1,000,000 in capital costs - Significant operations and maintenance costs, and/or - Some financing may be available	- Greater than USD $1,000,000 in capital costs, - High operations and maintenance costs, and/or - Little or no financing is available or may required funds outside MEM/Laos government (e.g. donors or international organization)
Implementation timing	0 to 2 years to complete implementation	From 2 to 5 years to complete implementation	More than 5 years to complete implementation
Feasibility (technical and political)	- Local staff have necessary expertise, - Local design and manufacturing services available, and/or - Strategy consistent with the Lao PDR power development plan and 5-year national socioeconomic development plan	- Southeast Asian, Indian, or Chinese expertise may be necessary, - Regional design and manufacturing services needed, and/or - There is some political support even if not in the power development plan or 5-year national socioeconomic development plan	- Western/European expertise needed, - World-class design and manufacturing services required, and/or - Strategy not consistent with power development plan or 5-year national socioeconomic development plan
Effectiveness	- Reduces the bulk of risk for a vulnerability (greater than 70% reduction in risk), - Reduces risk for many vulnerabilities, and/or - Addresses a high-priority vulnerability	- Reduces significant risk for a vulnerability (approximately 50% reduction in risk), - Reduces some risks for multiple vulnerabilities (2-3 types of vulnerabilities), and/or - Addresses a medium-priority vulnerability	- Reduces only a little risk for a vulnerability (less than 30% reduction in risk), - Reduces risk for only one vulnerability, and/or - Addresses a low-priority vulnerability

Outcomes

- Consolidated proposed strategies into 5 groups to support coordinated implementation
- Developed detailed action plans for each group, which included:
  - potential lead entities
  - proposed activities
  - potential funding sources
- Two of the proposed actions were incorporated into the power sector IRRP

Grouped Resilience Strategies to Implement
Implement Resilient Power System Policy
Improve Power System Flexibility
Improve Coordination Across Hydropower Dam Operations
Facilitate Better Sedimentation Management in Hydropower Watersheds
Ensure Government Oversight of Power Sector Operations

Key Assumptions

- **Time period:** 50 years (expected life of earthen dike)
- **Discount rate:** 12% real (inflation-adjusted)
- **Prices:** 2016 US dollars
- **Exchange rate:** 59 Meticais per USD
- **Avoided Damages[1]:**
  - Average value of homes : $915

Storm risk and damage of medium-sized and large-sized storm events in Central Mozambique

	Storm surge height	Annual risk of storm	% homes damaged in storm event
Medium-sized storm	3.8m	33%	80%
Large-sized storm	4.4m	1.7%	100%

[1]Source: INGC (2009)

Costs per Hectare of Mangrove Restoration

Actual costs from CCAP

- Hydrological restoration
  - Labor: $141
  - Material and equipment: $232
- Cost of buying and transporting seedlings and planting labor: $2,800
- Replacement of non-surviving seedlings: $369
- Transport costs for maintenance: $71

Additional annual costs estimated by CEADIR

- Mangrove protection labor: $71
- Technical assistance for beekeeping: $7
- Licensing for fishing and aquaculture: $163
- Fish production costs: $251
- Taxes: $1,295

Financial Benefits of Mangrove Restoration

Fish and shellfish production

- Global benefit transfer estimate (Rönnbäck1999)
- Valued at wholesale prices less trap costs, and labor
- Annual net benefit: $6,762/ha/y

Storm protection

- 7% of homes destroyed in medium and large storms

Aquaculture

- Benefit transfer: $5.16/ha/y (Tuah *et. al.*, 2013 for Vietnam)

Fuelwood

- Benefit Transfer: $16.80/ha/y (UNEP 2011, Kenya)

Apiculture

- Benefit Transfer: $15.81/ha/y (UNEP 2011, Kenya)