Disaster and Climate Change Risk Assessment Methodology for IDB Projects

Developing climate resilient infrastructure PPPs
Webinar 2: An introduction to the tools and how to use them to prepare resilient projects

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OUTLINE

1. Institutional Background

2. Methodology
   - 3 phases
   - 5 steps

3. Lessons Learned

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BACKGROUND

OP-704

DISASTER RISK MANAGEMENT POLICY

Approach focused on **PREVENTION**

DIRECTIVE A-1

PROGRAMMING

Disaster Risk Management Projects

- Investment Loans
- Policy Based Loans
- Contingent Credit Lines

DIRECTIVE A-2

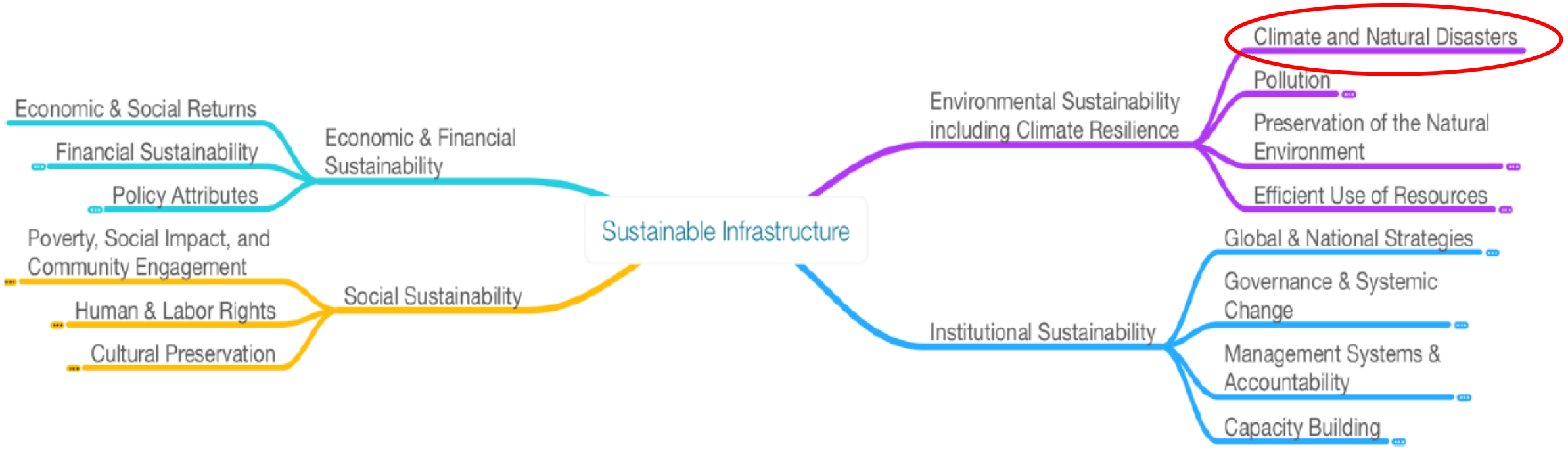
PREPARATION AND EXECUTION OF PROJECTS

Risk and project viability

- Screening and DRA

BACKGROUND

Figure 1: The Four Dimensions of Infrastructure Sustainability



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COMMUNITY OF PRACTICE ON RESILIENCE

Climate Change

Environment, Rural Development and Disaster Risk Management

Environmental and Social Safeguards Unit

Objective: establish a **unified methodology** for the identification, evaluation and management of **climate and disaster risks** for IDB projects

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DISASTER AND CLIMATE CHANGE RISK ASSESSMENT METHODOLOGY

https://publications.iadb.org/en/executive-summary-disaster-and-climate-risk-assessment-methodology-idb-projects-technical-reference

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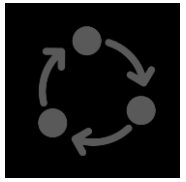
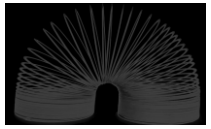
LESSONS LEARNED

Integrated approach to risk



Sequential and **gradual** process



Time **flexibility** in the project cycle, qualitative & quantitative

There are common principles, but it should be **tailored** to the institution

Its good to have/or obtain **in-house capacity**: on engineering and risk

Methodology

Phase

1 Screening & Classification

2 Qualitative Assessment

3 Quantitative Assessment

Identification » Preparation » Implementation » (These steps may be completed during execution)

Project Cycle

Methodology

Phase

1 Screening & Classification		2 Qualitative Assessment		3 Quantitative Assessment
Step 1 **Hazard exposure**	Step 2 **Criticality & vulnerability**	Step 3 **Narrative**	Step 4 **Qualitative analysis**	Step 5 **Quantitative analysis**
Preliminary classification based on location and hazards	Revision of classification based on criticality & vulnerability	Simplified qualitative risk assessment (narrative with diagnostic) & management plan	Complete qualitative risk assessment (workshop to identify failures, causes and solutions) & management plan	Quantitative risk assessment (scientific assessment quantifying risk) & management plan

Identification » Preparation » Implementation » (These steps may be completed during execution)

Project Cycle

Methodology

Phase

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Preliminary classification based on location and hazards

Step 2 Criticality & vulnerability

Revision of classification based on criticality & vulnerability

Low

No action necessary

Step 3 Narrative

Simplified qualitative risk assessment (narrative with diagnostic) & management plan

Moderate

Existing measures are sufficient

Qualitative DRA&DRMP

Step 4 Qualitative analysis

Complete qualitative risk assessment (workshop to identify failures, causes and solutions) & management plan

risk

Moderate & High

Tolerable uncertainty and/or impacts

Qualitative DRA&DRMP

Step 5 Quantitative analysis

Quantitative risk assessment (scientific assessment quantifying risk) & management plan

Moderate & High

Tolerable risk

Quantitative DRA&DRMP

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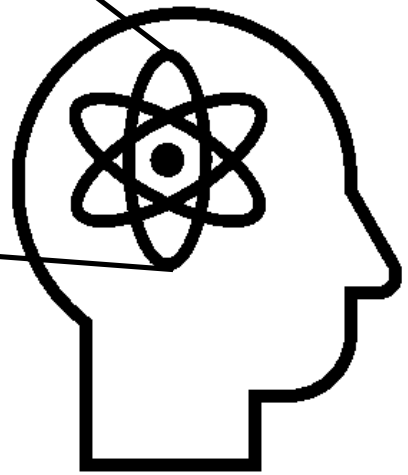
Project Cycle

DISASTER AND CLIMATE CHANGE RISK ASSESSMENT METHODOLOGY



System level

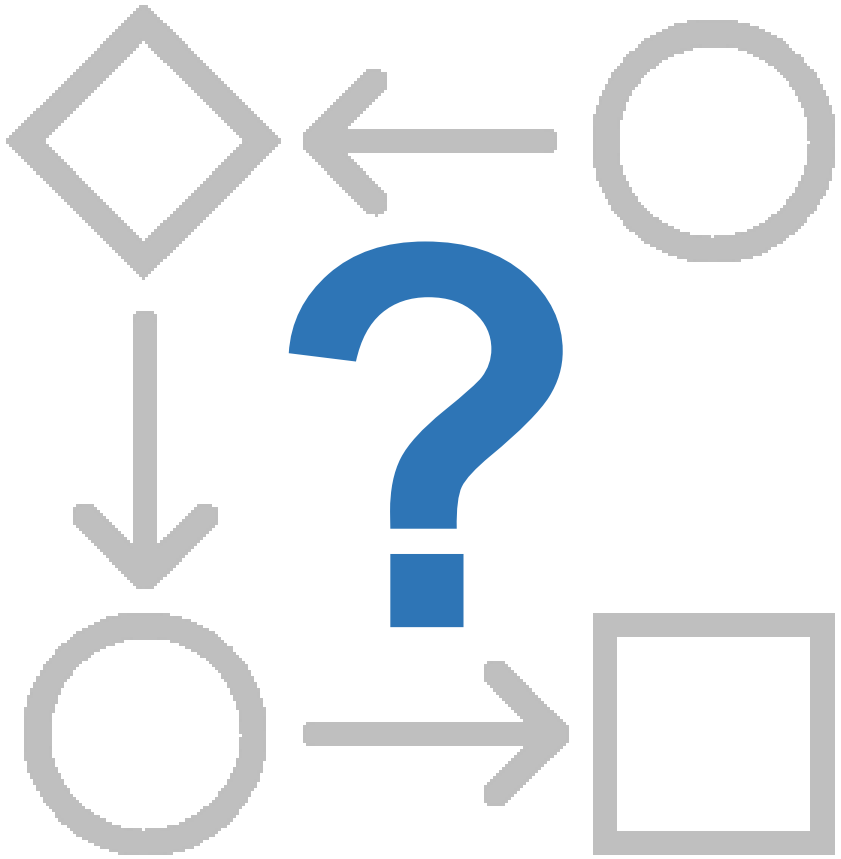
Replicate this logic to other systems (country's systems), adapting it to their own conditions

Project level

How to apply an identification and evaluation process in specific projects

DISASTER AND CLIMATE CHANGE RISK ASSESSMENT METHODOLOGY

Country systems



DISASTER AND CLIMATE CHANGE RISK ASSESSMENT METHODOLOGY

Methodology

Phase

1 Screening & Classification		2 Qualitative Assessment		3 Quantitative Assessment
Step 1	Step 2	Step 3	Step 4	Step 5
?	?	?	?	?

?

Project Cycle

Phase1

Screening

Step 1

Hazard Screening

HAZARD SCREENING

A questionnaire embedded in the Bank's system

+

Support tools

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HAZARD SCREENING

QUESTIONNAIRE example

These answers trigger (or not) the policy and determine if CC staff is needed

	YES	NO
The operation is in a geographical area exposed to natural hazards. (Climate change may increase the frequency and/or intensity of some hazards).	( )	( )
The sector of the operation is vulnerable to natural hazards. (Climate change may increase the frequency and/or intensity of some hazards).	( )	( )
The operation has the potential to exacerbate risk to human life, property, the environment or cause economic disruption.	( )	( )
The specific objective of the operation is climate change adaptation.	( )	( )
The operation includes activities related to climate change adaptation, but these are not the primary objective of the operation.	( )	( )

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HAZARD SCREENING

QUESTIONNAIRE con't

These answers provide a disaster risk classification

Exposure of project to natural hazards?

	YES	NO
Seismic events	( )	( )
Coastal flooding	( )	( )
Inland flooding	( )	( )
Hurricanes	( )	( )
Landslides	( )	( )
Drought	( )	( )
Volcanic activity	( )	( )
Sea level rise	( )	( )
Wildfires, heatwaves, blizzards	( )	( )
Glacial retreat	( )	( )
Other slow-onset climate related changes (temp, precipitation, insolation, seasonal patterns)	( )	( )

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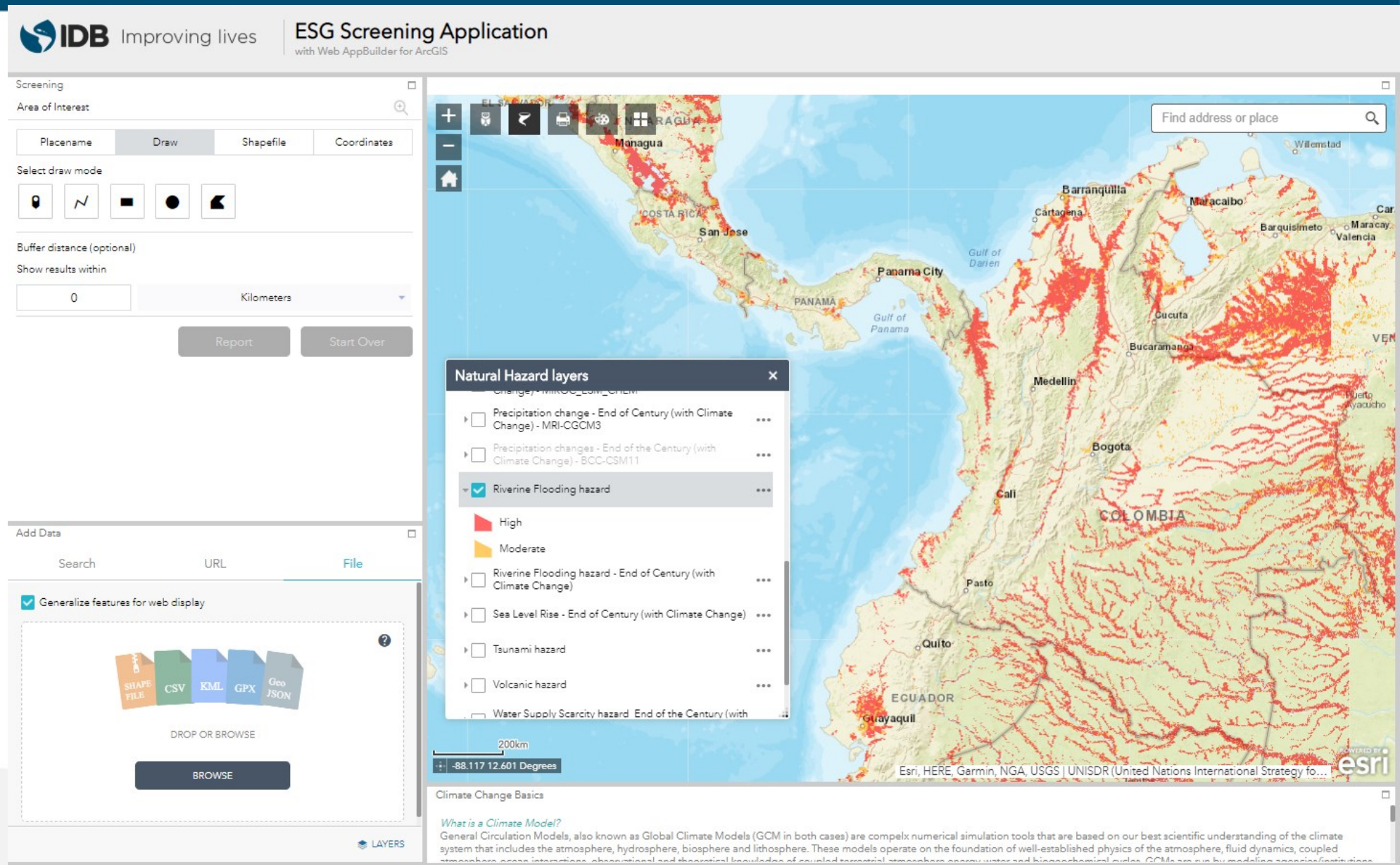
HAZARD SCREENING

Support tool – hazard component

- Earthquakes
- Hurricane - wind
- Storm Surge
- Drought + CC
- Sea Level Rise + CC
- Volcanoes
- Precipitation + CC
- Wildfires
- Landslides
- Tsunami
- Heat waves + CC
- Riverine flooding + CC



Step 2

Criticality & Vulnerability

CRITICALITY AND VULNERABILITY

Support tool: vulnerability component

Identify a project's characteristics that make it more or les vulnerable to natural hazards

¿Operation scope – new design/build, modernization/upgrading, planning or others?

¿What is the expected life span of the different project components?

¿If any of the project components were to fail, is there potential for loss of lives?

¿How many people will the project serve?

¿Are there redundant systems that may be used if any component were to fail?

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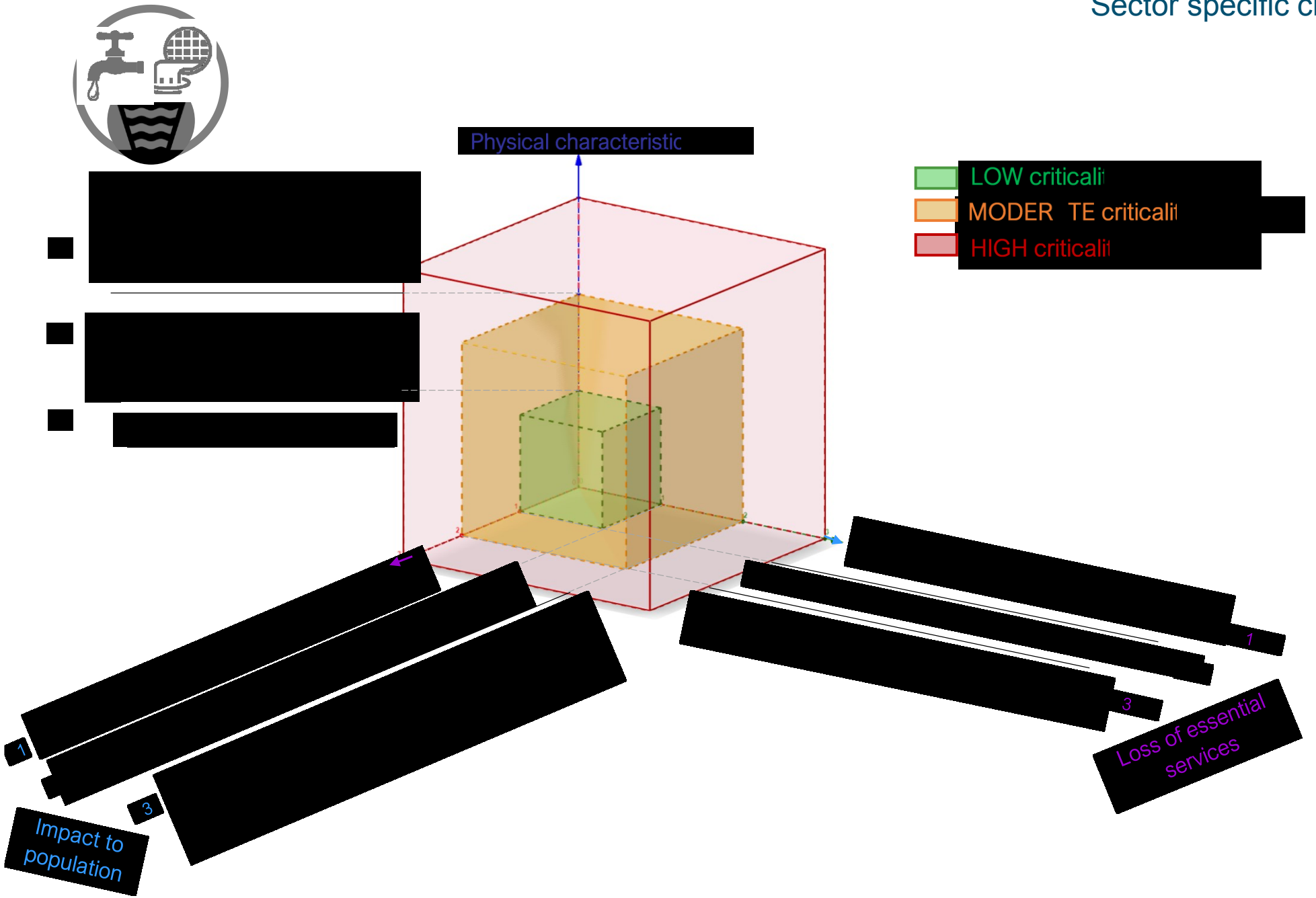
Physical characteristic
LOW criticali
MODER TE criticali
HIGH criticali
1
3
Impact to population
1
3
Loss of essential services

Phase2

Qualitative disaster and climate change risk assessment

Methodology

Phase

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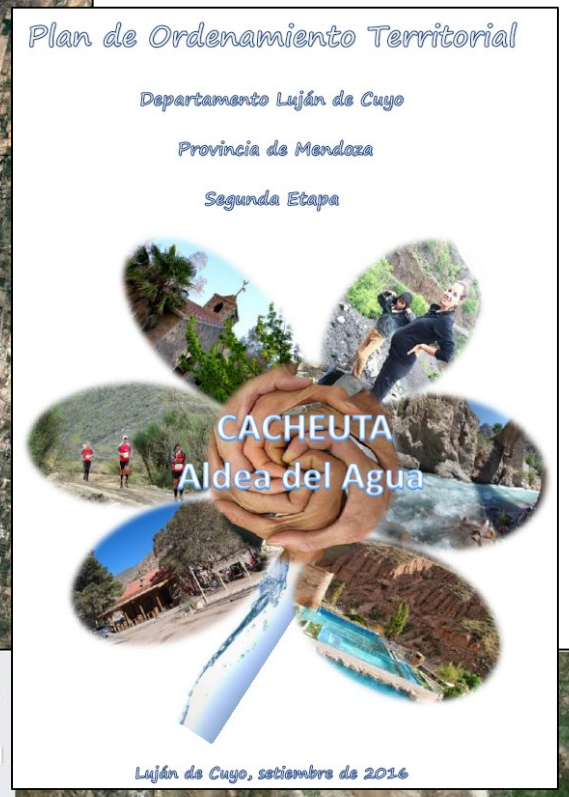
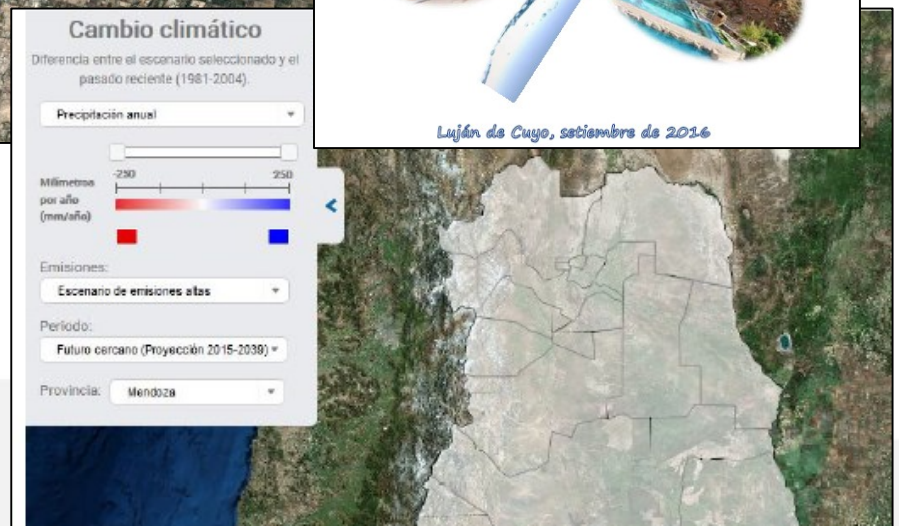
Project Cycle

Step 3

Narrative

NARRATIVE





Existing studies

¿Are there previous risk studies? (¿Have the impacts of natural hazards on the operation and of the operation on the risk conditions of the area been considered?)

Hazard evaluation

¿Has the local meteorology, hydrology and climate change been studied and how? (¿Local gauges? ¿GCM/RCM? ¿Official standards to incorporate climate change projections?)

¿Has the local geology and seismicity been studied? (¿Have the hills been studied? ¿Have faults been studied? ¿Is there a seismic catalogue?)

Design considerations

¿What hydrological and hydraulic parameters were used to design culverts and drainage? (¿Types of analyses, methods, return periods, climate change?)

¿Have slope stabilization measures been studied?

¿What seismic design code was used? (¿Is there a local code?)

Response systems

¿Does an Early Warning System exist or planned?

Is there an institution in charge of managing and centralizing all disaster and climate risk efforts?

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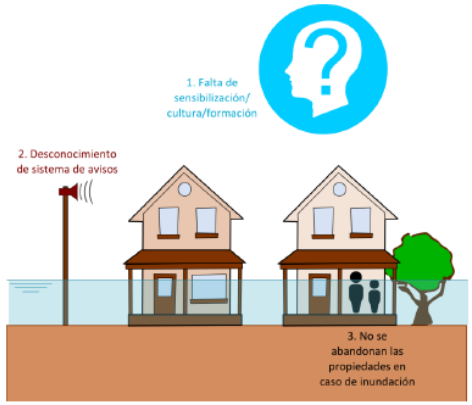
Step 4

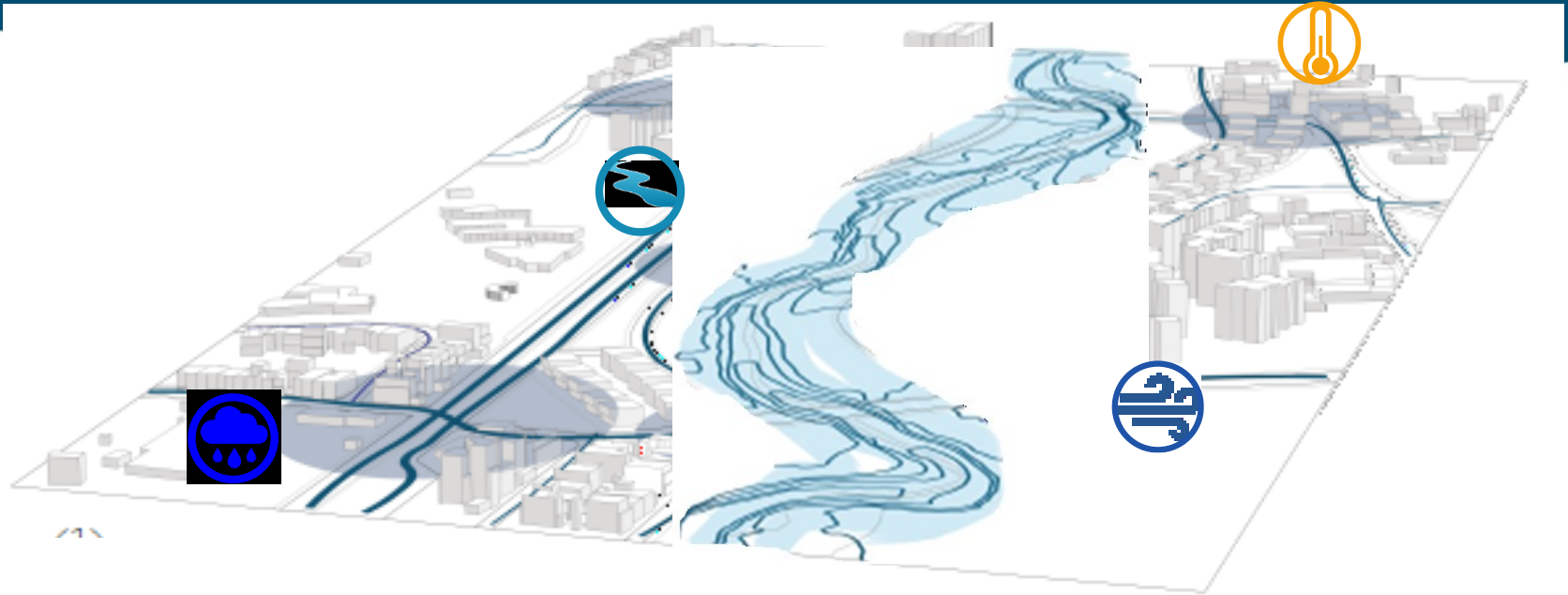
Qualitative assessment

QUALITATIVE EVALUATION

Modo de fallo E2	
Título	Permanencia en zonas potencialmente inundables
Descripción	
En escenario hidrológico, se produce la inundación pluvial o fluvial de algunos tramos de la RN5. Debido a la falta de sensibilización y formación en riesgos de inundación de la población residente en estas viviendas, los ciudadanos desconocen los protocolos de actuación y los sistemas de aviso, por lo que no han abandonado sus viviendas para ir a una zona segura cuando llega la inundación. Por este motivo, las inundaciones producen mayores pérdidas humanas.	
Esquema gráfico	



Factores que aumentan el riesgo	Factores que disminuyen el riesgo
▪ Problemas de sensibilización y concienciación de gran parte de la población urbana, que no quieren abandonar su casa por miedo a perder sus pertenencias. ▪ Bajo nivel educativo de parte de la población en las zonas afectadas. ▪ Los planes, campañas y normativas tienen dificultad en llegar a todos los habitantes, especialmente a los residentes en los asentamientos informales. ▪ Inseguridad ciudadana puede dificultar tareas de aviso y evacuación.	▪ Tras los daños causados por los huracanes Ike y Hanna en 2008, es posible que una campaña de sensibilización surja mayor efecto sobre la población local.



RISK ASSESSMENT MATRIX

SEVERITY / PROBABILITY	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	High	High	Serious	Medium
Probable (B)	High	High	Serious	Medium
Occasional (C)	High	Serious	Medium	Low
Remote (D)	Serious	Medium	Medium	Low
Improbable (E)	Medium	Medium	Medium	Low
Eliminated (F)	Eliminated			

Phase3

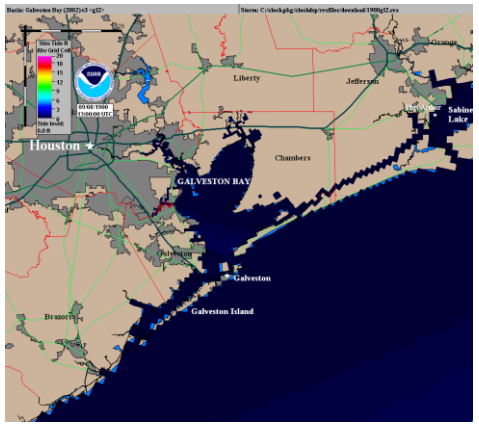
Quantitative disaster and climate change risk assessment

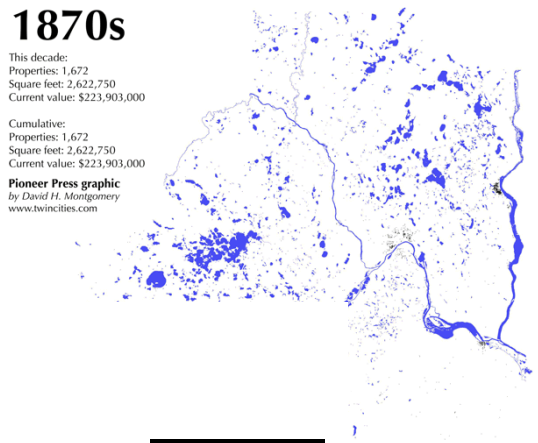
Step 5

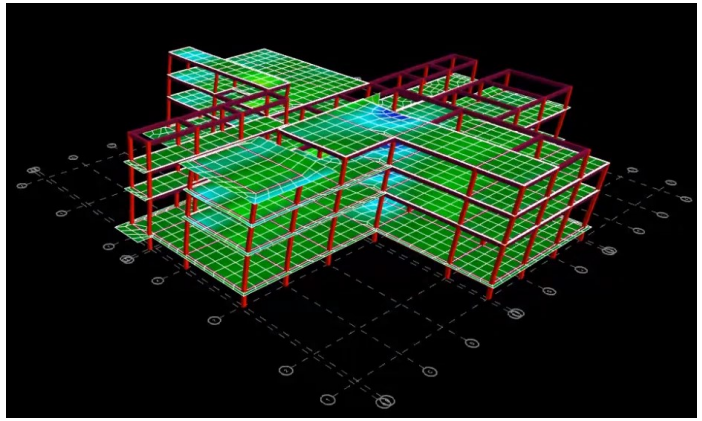
Quantitative assessment

QUANTITATIVE EVALUATION

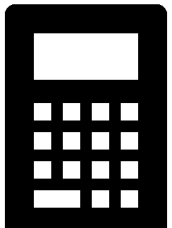
Create hazard, exposure and vulnerability models…







… and calculate [redacted] **risk**



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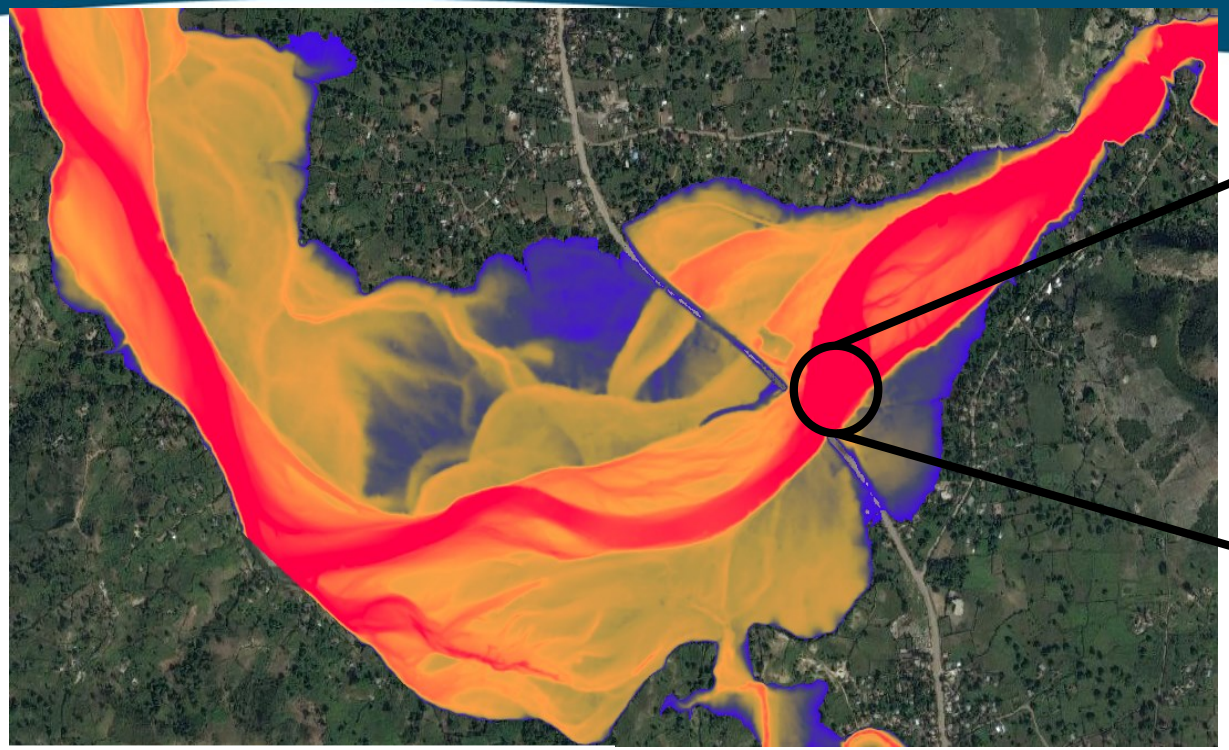
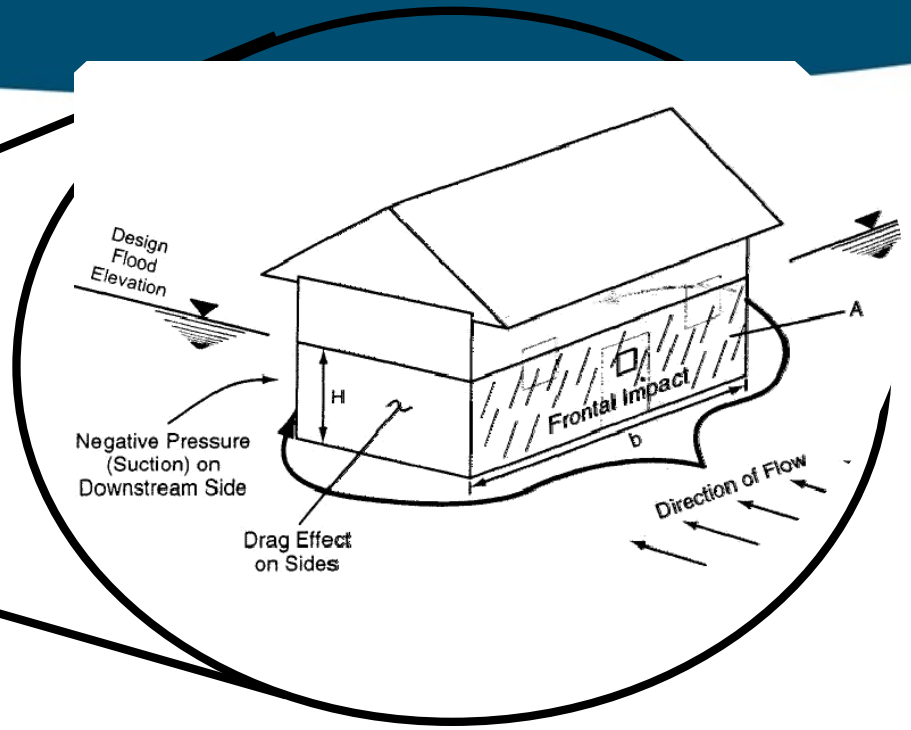
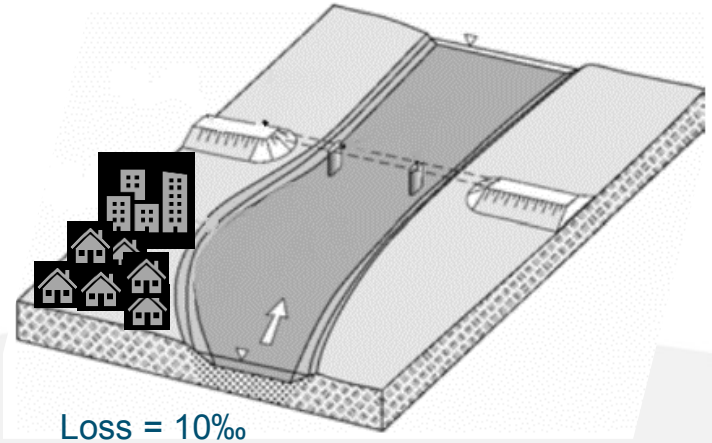
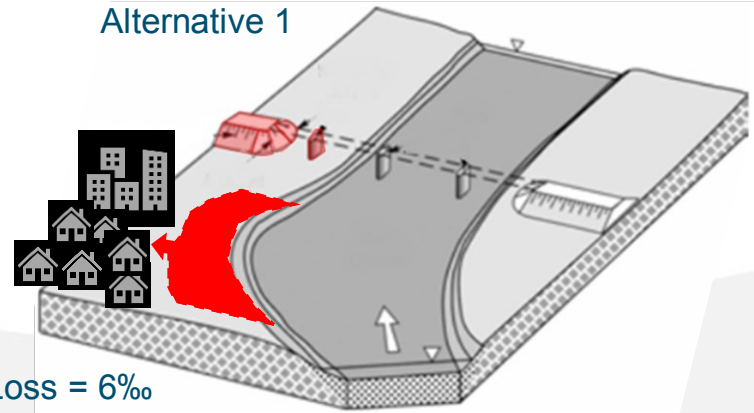
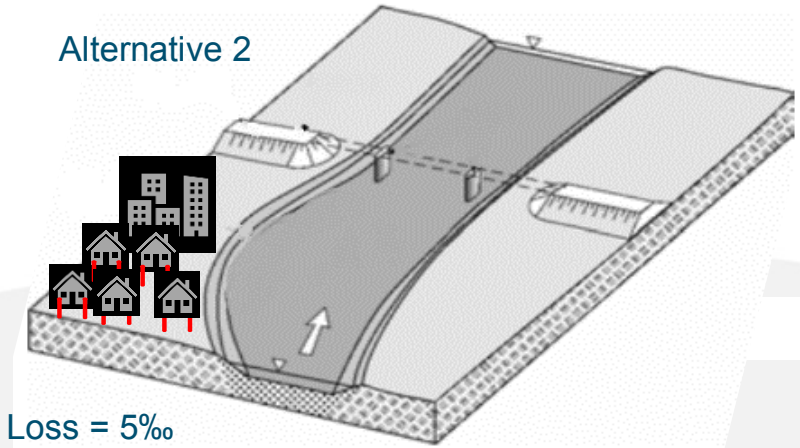
QUANTITATIVE EVALUATION





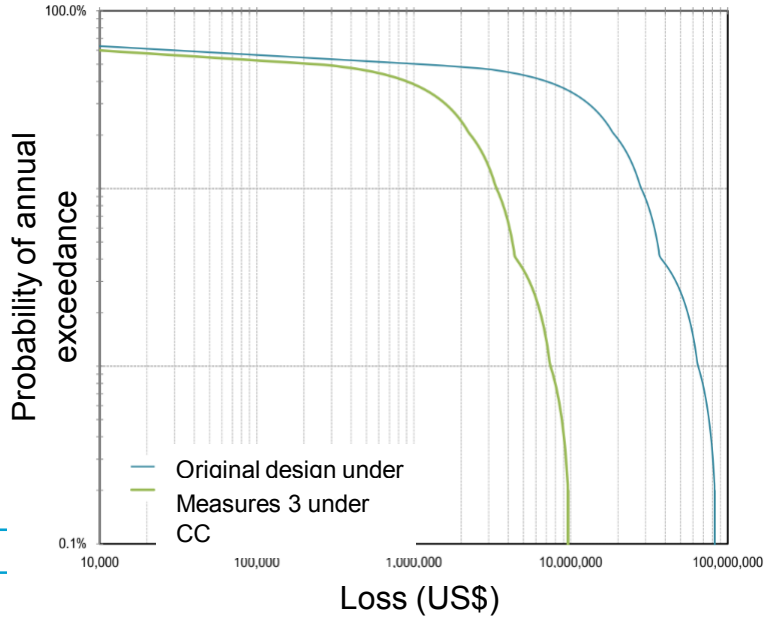


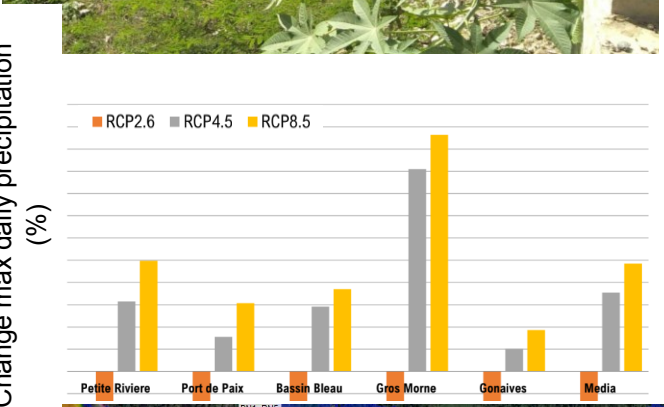


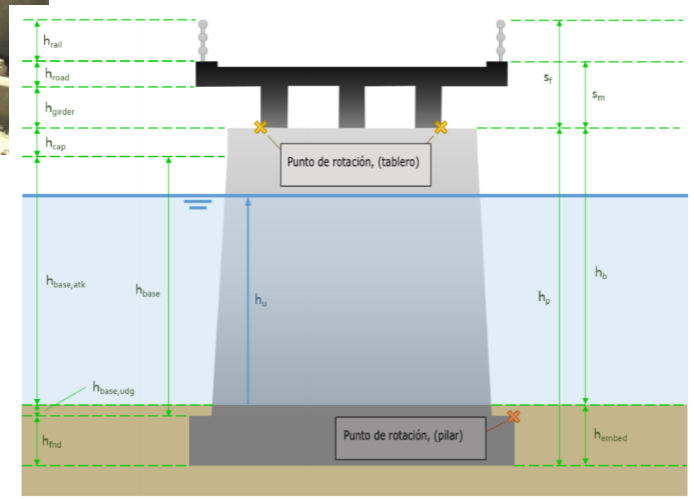


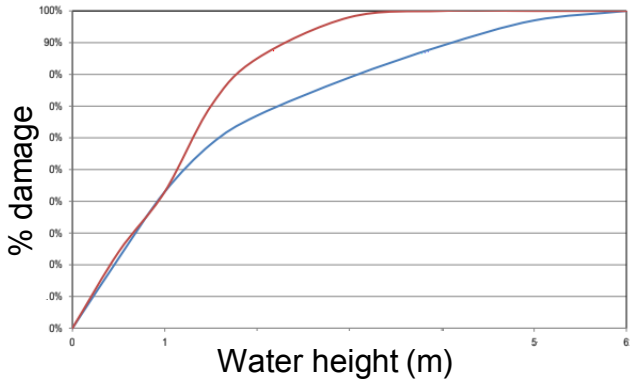
Example: Rehabilitation of a road

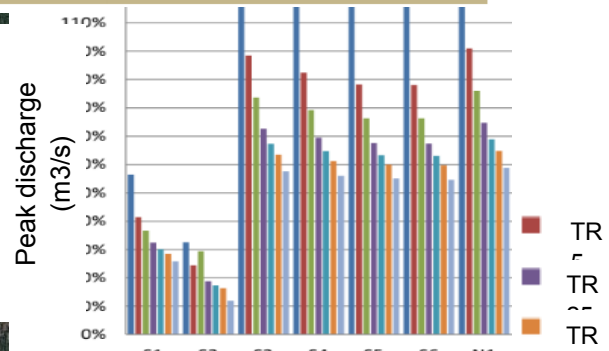
Section	Return Period	Damage (%) Current conditions	Measures 1	Current + CC	Measures 2	Measures 3
BS3-BS4	2	16%	12%	55%	30%	20%
	5	16%	28%	63%	40%	35%
	10	23%	35%	68%	45%	41%
	25	30%	40%	71%	48%	45%
	50	35%	43%	73%	50%	48%
	100	39%	46%	75%	52%	50%
	500	63%	50%	84%	55%	54%







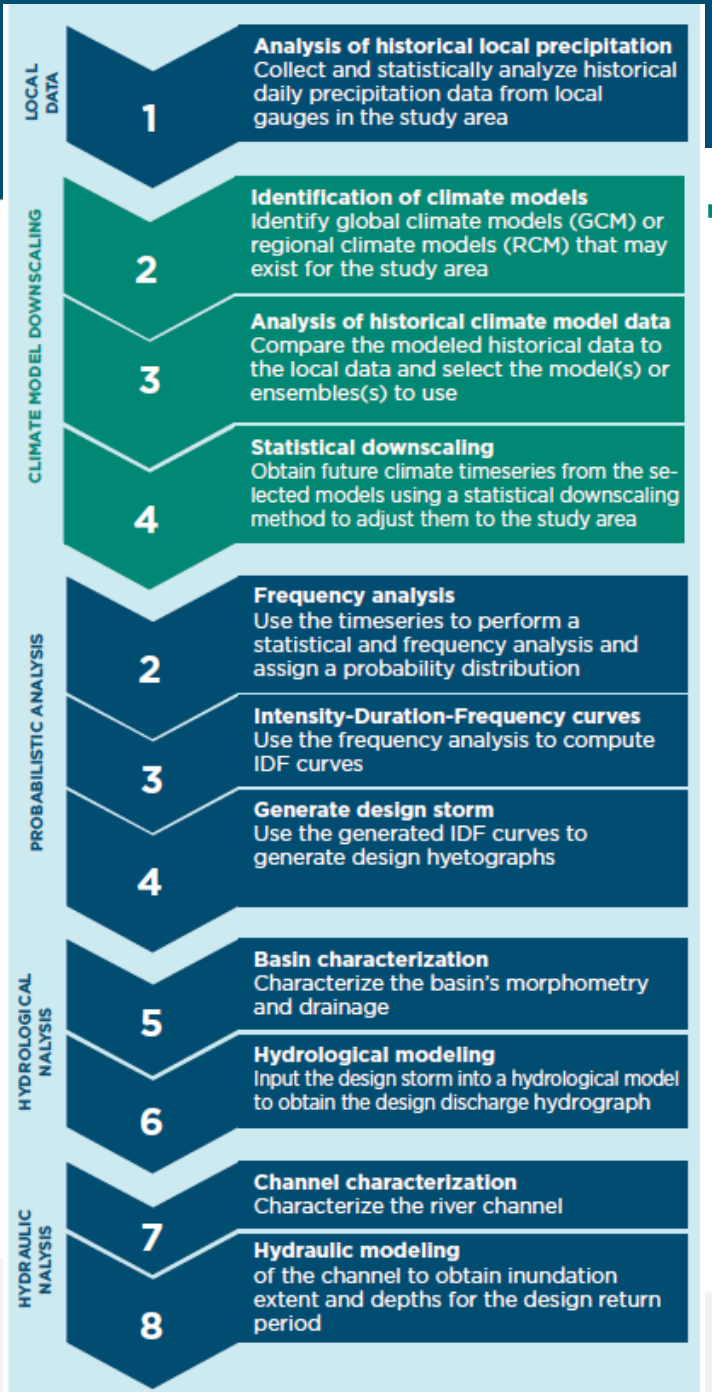




Paved road

Unpaved road

QUANTITATIVE EVALUATION



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hange

Incorporation of Climate Change in standard analyses

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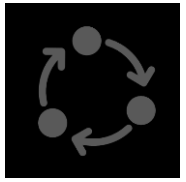

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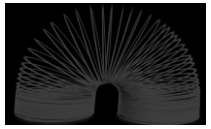

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Thank you!

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