



SUITABILITY MODEL

RISK INFORMED DECISIONS FOR PLANNING AND INVESTMENT



**Regional EST Policy Dialogue
and Training Workshop for
South Asia and South-East
Asia**

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DISASTERS CAN HAVE DEVASTATING IMPACTS



1.4

PEOPLE

DISASTERS FROM NATURAL HAZARDS AFFECTED 1.4
BILLION PEOPLE*

500

LIVES

DISASTERS FROM NATURAL HAZARDS CLAIMED 500
THOUSAND LIVES*

523

ECONOMY

DISASTERS FROM NATURAL HAZARDS CAUSED \$523
BILLION IN ECONOMIC LOSSES*

*ASIA-PACIFIC, 2005-2014

“IF [A PLAN] IS NOT RISK-INFORMED, IT [CAN'T LEAD TO] SUSTAINABLE DEVELOPMENT ”

– United Nations Development Programme –



IS YOUR PLAN RISK-INFORMED?

D OES YOUR DEVELOPMENT PLAN TAKE HAZARDS AND VULNERABILITIES INTO ACCOUNT?

I S YOUR METHOD CONSIDERING CLIMATE CHANGE PROJECTIONS?

Y ET YOU ARE UNAWARE ABOUT THE ECONOMIC RISKS A DISASTER CAN PUT ON YOUR COMMUNITY?





WHAT IS THE ISSUE AT HAND?

STANDARD HAZARD MAPPING METHODS ONLY DEPICT RISK CATEGORIES FOR DIFFERENT HAZARDS IN A PRE-DEFINED AREA

NO INFORMATION ABOUT THE EXPECTED DAMAGES OR **MONETARY LOSSES FROM RISKS** ASSOCIATED WITH DIFFERENT HAZARDS

THE **FINANCIAL LIABILITIES** OF DISASTER? AND CLIMATE RISKS ARE DIFFICULT TO PREDICT





WE SUPPORT YOU TO REVEAL THE FINANCIAL LIABILITIES OF RISKS

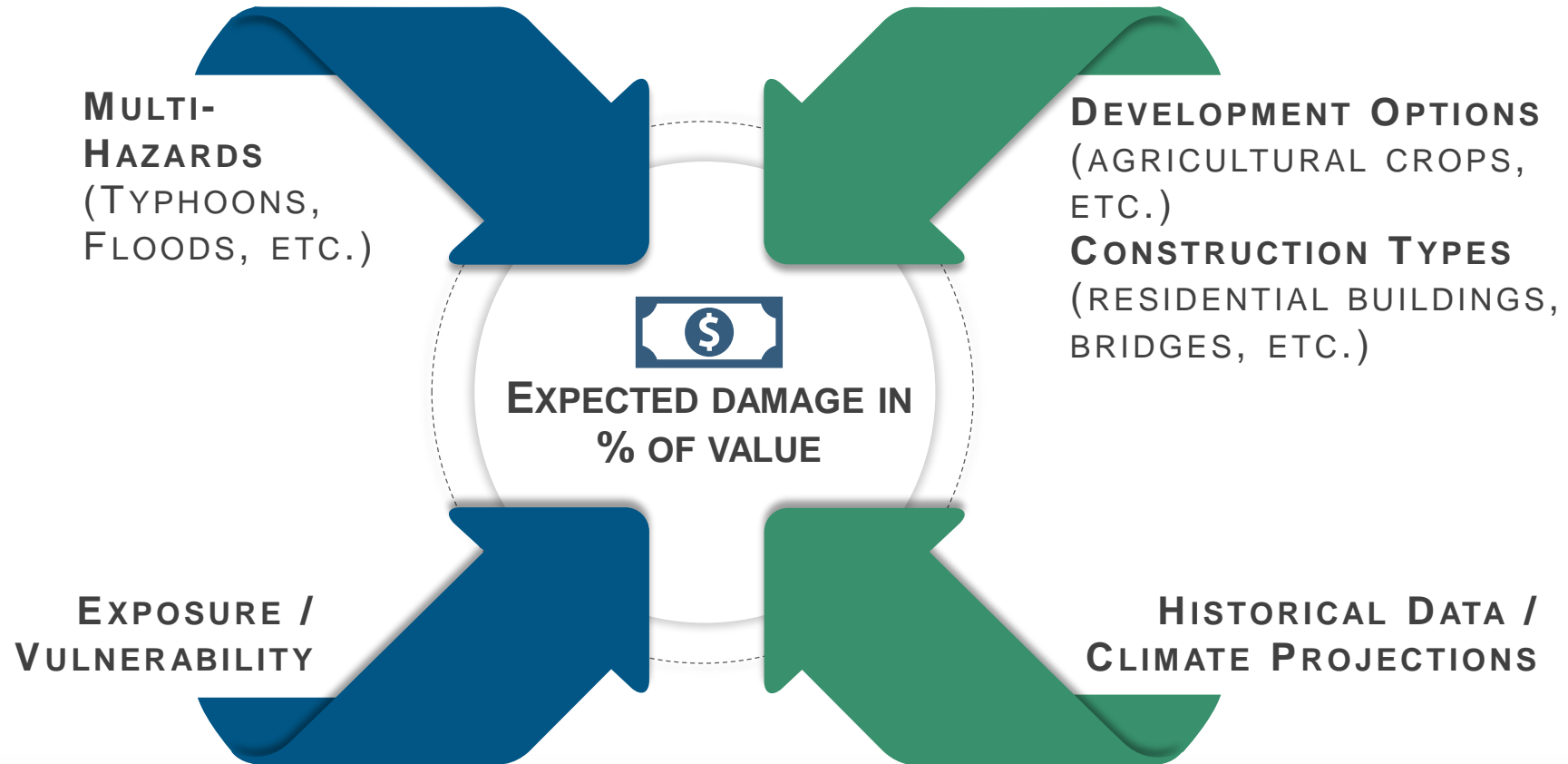
THE **SUITABILITY MODEL** SEEKS TO DELIVER **EASY-TO-UNDERSTAND** AND **READY-TO-PROCESS** LAND USE PLANNING AND INVESTMENT DIRECTIONS

PROVIDES CONTEXT-SPECIFIC **QUANTIFICATIONS OF RISKS** FROM POTENTIAL HAZARDS FOR LAND USE OR INVESTMENT PLANS IN A PREDEFINED AREA OF LAND

METHODOLOGY FOLLOWS A **SIMPLE STEP-BY-STEP GUIDELINE** SO USERS ONLY NEED TO HAVE BASIC KNOWLEDGE OF THE PROCESSES INVOLVED

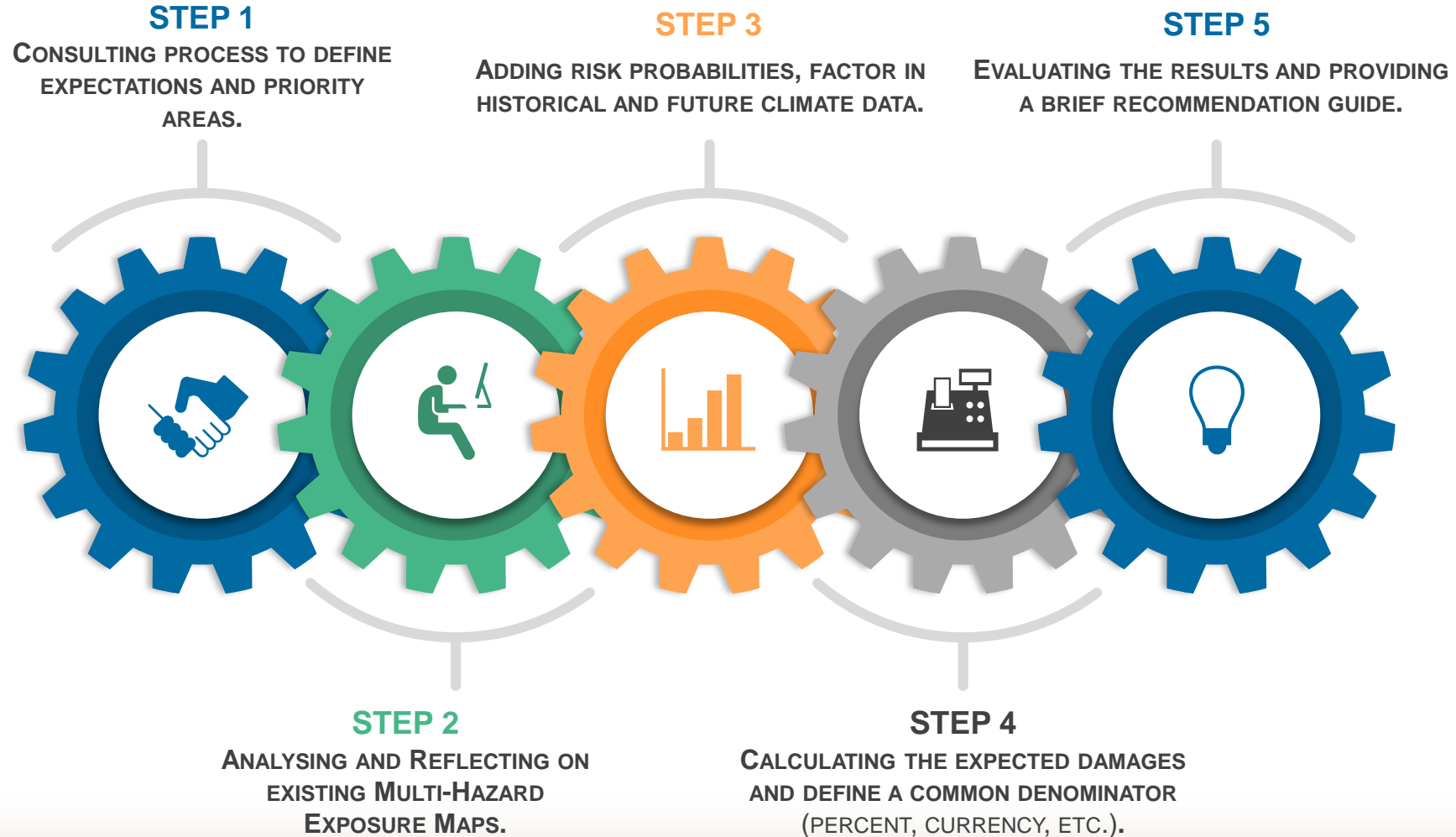


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THE PROCESS OF THE SUITABILITY MODELLING



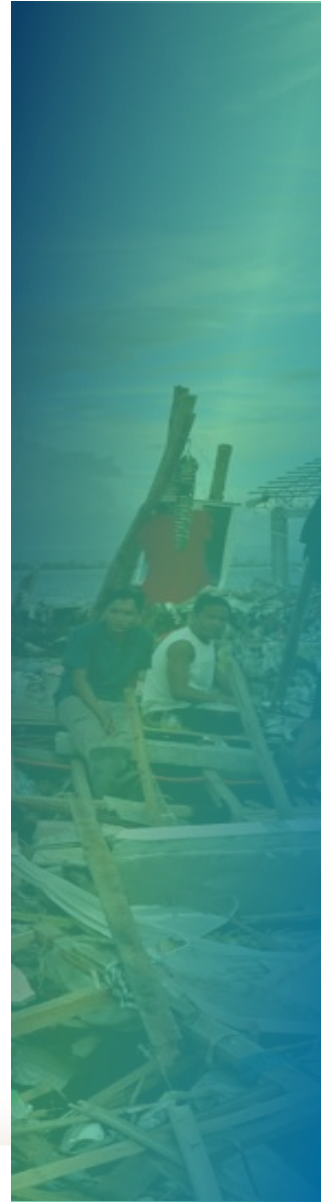
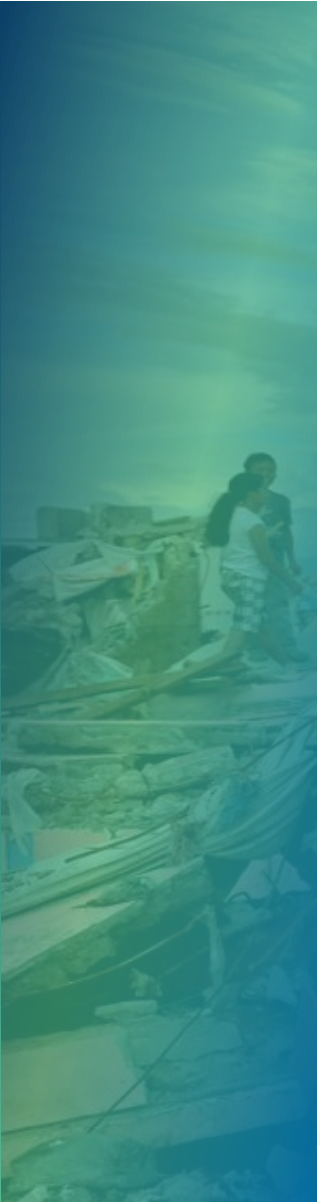


TECHNICAL METHODOLOGY – HOW DOES THE SUITABILITY MODEL WORK?

- ✓ **BUILDING A MULTI-HAZARD EXPOSURE MAP**
IDENTIFY POSSIBLE HAZARDS | **LAYER HAZARDS** ON A BASELINE MAP
OF YOUR AREA

- ✓ **ADDING RISK PROBABILITIES TO YOUR MAP**
ADD RISKS BY **DIFFERENT HAZARDS** | FACTOR IN **LOCATIONS AND**
RETURN PERIODS

- ✓ **HARMONISE FOR MULTIPLE RISKS DUE TO MULTIPLE HAZARDS**
CALCULATE THE **EXPECTED DAMAGES** | DEFINE A **COMMON**
DENOMINATOR





METHOD – HOW DOES THE SUITABILITY MODEL WORK?

✓ BUILDING A MULTI-HAZARD EXPOSURE MAP

IDENTIFY POSSIBLE **HAZARDS** | **LAYER HAZARDS** ON A BASELINE
YOUR AREA

FLOODS
STORM SURGES
TYPHOONS
EARTHQUAKES
TSUNAMI
LANDSLIDES

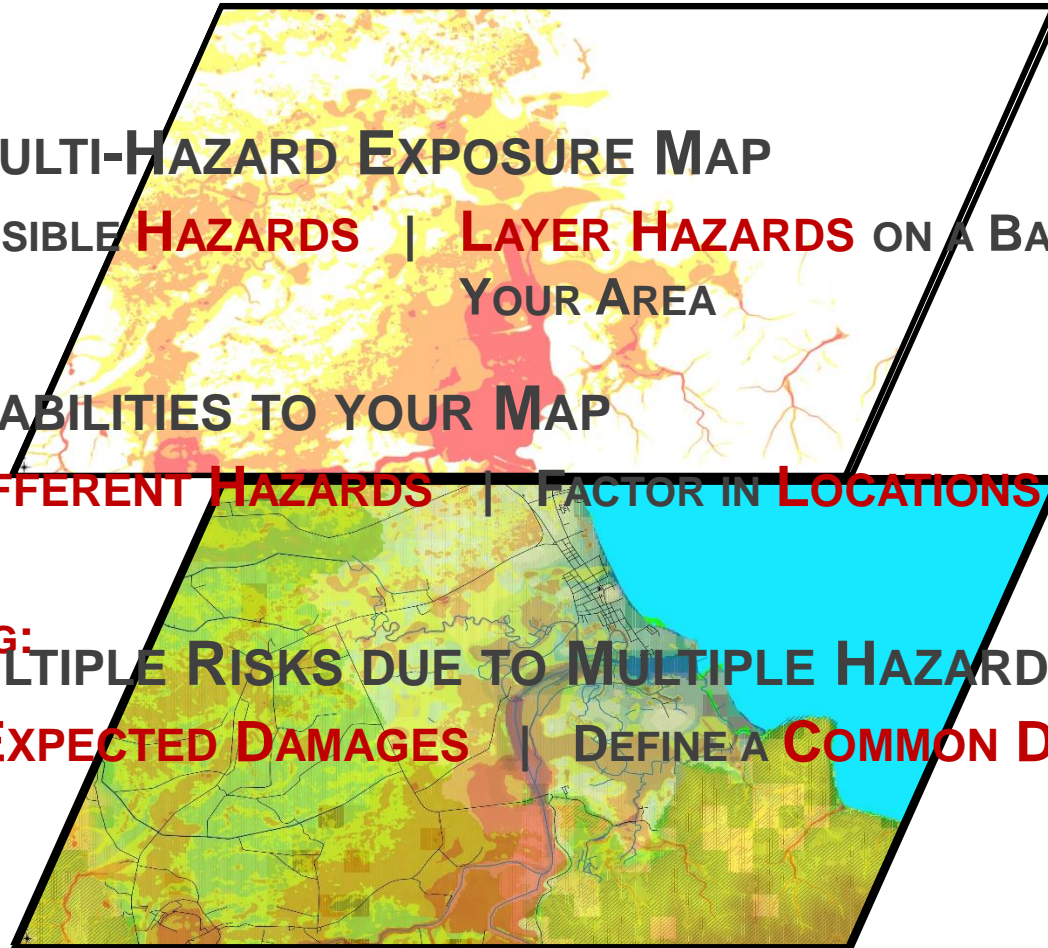
✓ ADDING RISK PROBABILITIES TO YOUR MAP

ADD RISKS BY **DIFFERENT HAZARDS** | **FACTOR IN LOCATIONS AND RETURN PERIODS**
LAYERED HAZARD MAP, INCLUDING:

BASE MAP, INCLUDING:

✓ HARMONISE FOR MULTIPLE RISKS DUE TO MULTIPLE HAZARDS

- CALCULATE THE **EXPECTED DAMAGES** | DEFINE A **COMMON DENOMINATOR**
- ALTITUDE
- ROADS
- RIVERS





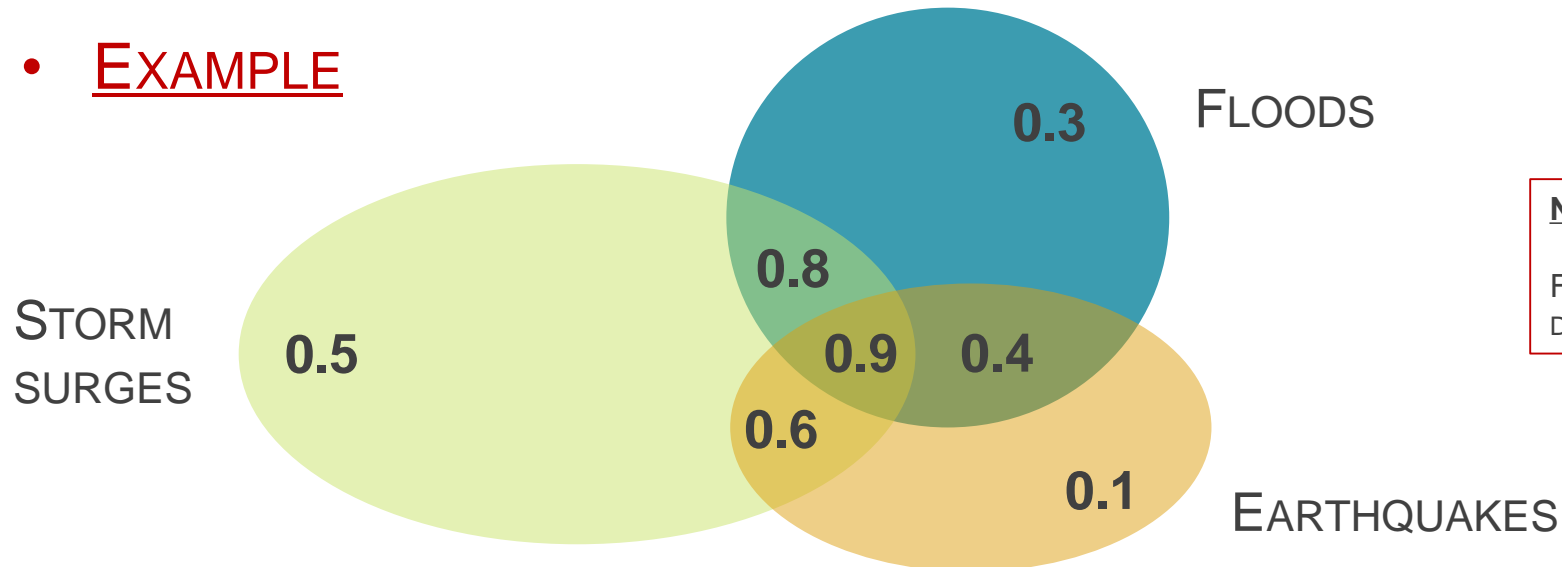
✓ ADDING RISK PROBABILITIES TO YOUR MAP

ADD RISKS BY **DIFFERENT HAZARDS** | FACTOR IN **LOCATIONS AND RETURN PERIODS**

- **GENERALLY**

ADDING RISKS CAUSED BY DIFFERENT HAZARDS GIVES A MULTI-HAZARD RISK MAP

- **EXAMPLE**



NOTE:

FIGURES IN EXPECTED %
DAMAGE PER YEAR



✓ **ADDING RISK PROBABILITIES TO YOUR MAP**

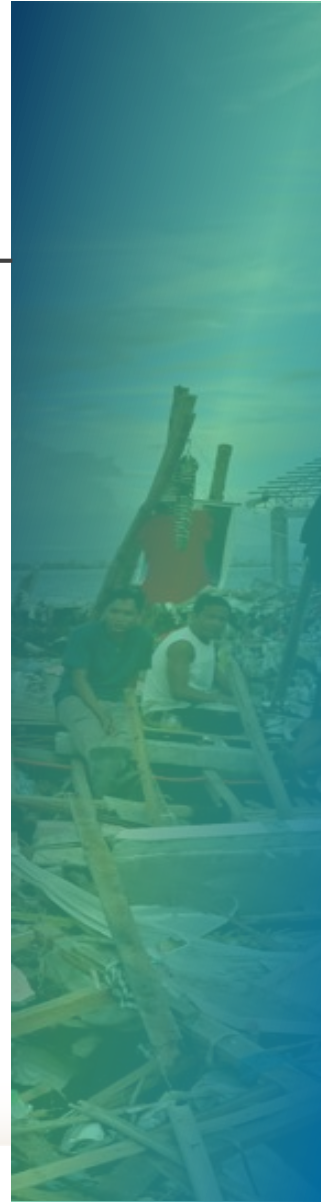
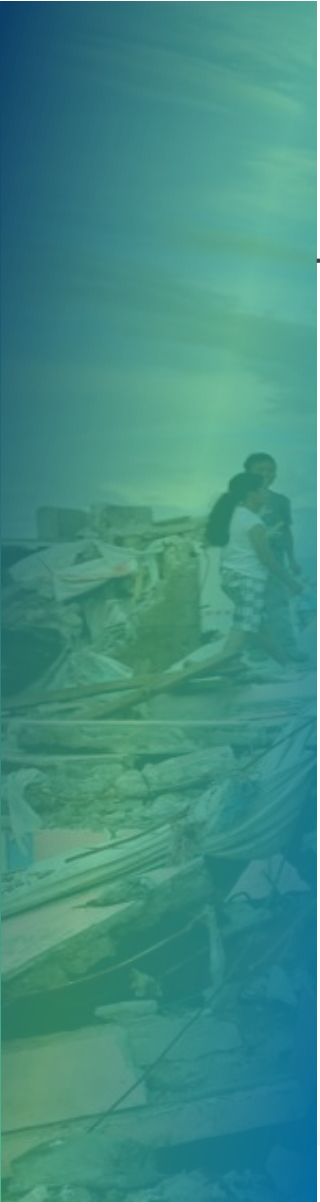
ADD RISKS BY **DIFFERENT HAZARDS** | FACTOR IN **LOCATIONS AND RETURN PERIODS**

! **BUT**

SOME AREAS OF LAND ARE LESS, OTHERS ARE MORE EXPOSED AND VULNERABLE TO NATURAL HAZARDS

! **LIKewise**

DIFFERENT RETURN PERIODS OF SPECIFIC HAZARDS NEED TO BE ACCOUNTED FOR

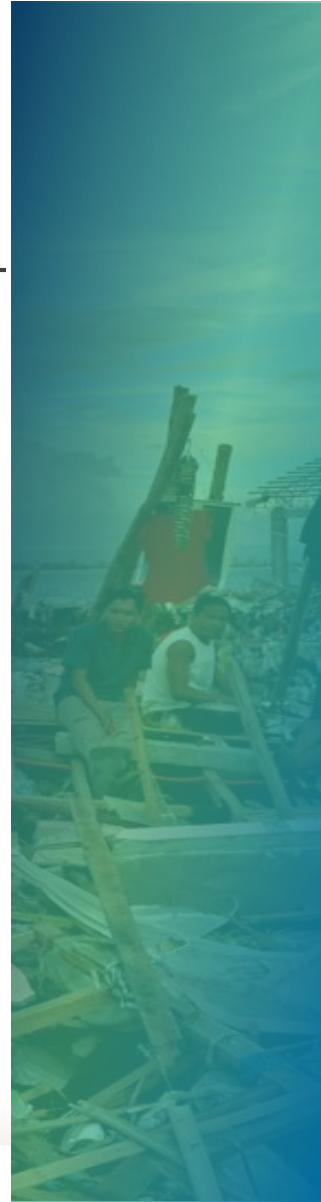
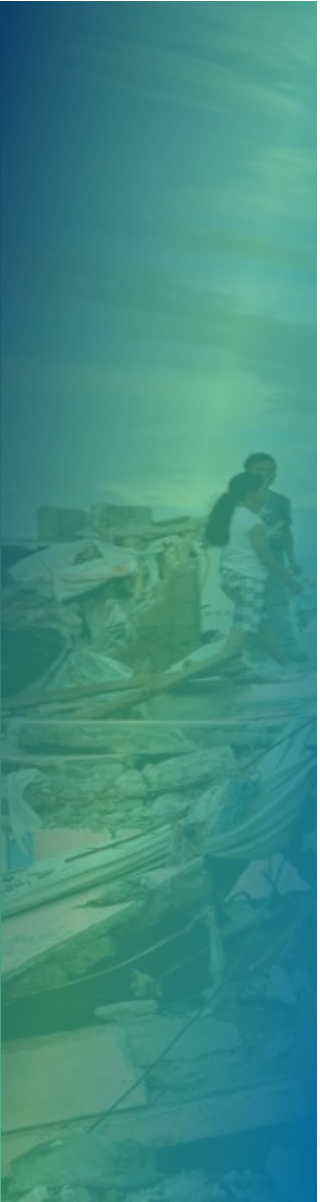




✓ ADDING RISK PROBABILITIES TO YOUR MAP

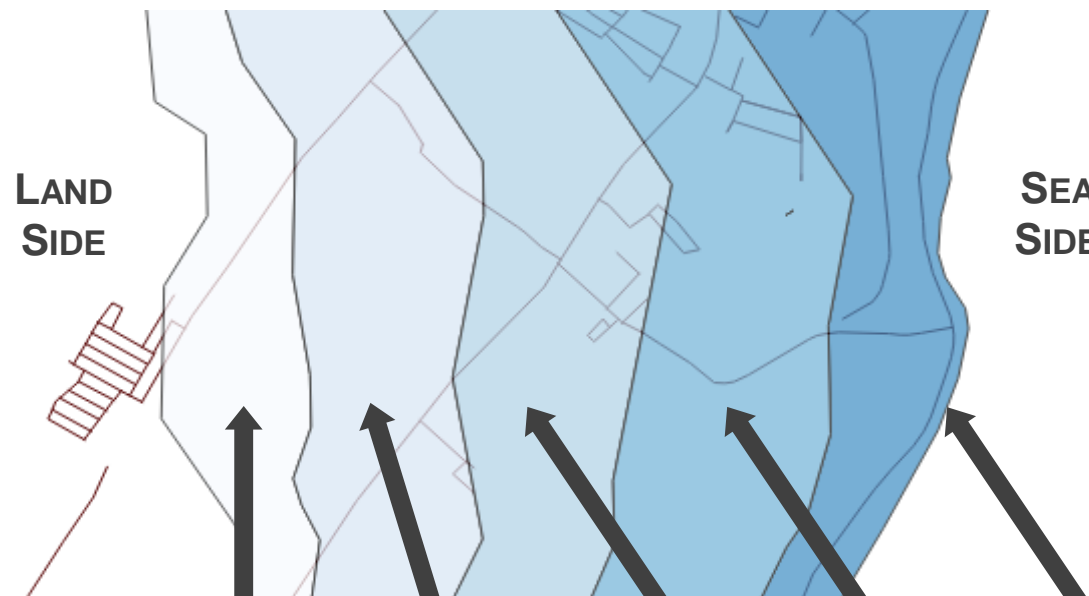
ADD RISKS BY **DIFFERENT HAZARDS** | FACTOR IN **LOCATIONS AND RETURN PERIODS**

- EXAMPLE





DECREASING IMPACT
OF STORM SURGES
AND TSUNAMI
• **EXAMPLE**

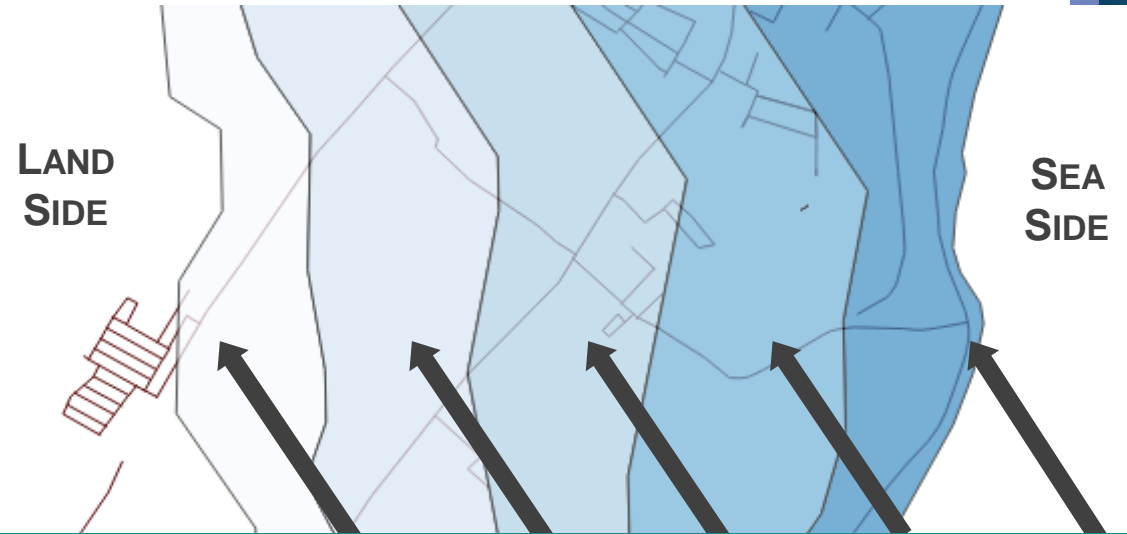


HEIGHT AT SHORE	EXPECTED DAMAGE ACCORDING TO WATER HEIGHT				
5M	5%	10%	40%	60%	80%
4M		5%	10%	40%	60%
3M			5%	10%	40%
2M				5%	10%
1M					5%



- ADDITIONALLY**

TAKING INTO ACCOUNT
DIFFERENT RETURN
PERIODS



HEIGHT AT SHORE	RETURN PERIOD	PROBABILITY	EXPECTED <u>ANNUAL</u> DAMAGE PER WATER HEIGHT					
5M	500 YEARS	0.002	0.01%	0.02%	0.08%	0.12%	0.16%	
4M	300 YEARS	0.003	0.02%	0.03%	0.13%	0.20%		
3M	200 YEARS	0.005	0.03%	0.05%	0.20%			
2M	100 YEARS	0.010	0.05%	0.10%				
1M	50 YEARS	0.025	0.10%					
TOTAL			0.01%	0.04%	0.14%	0.35%	0.76%	



✓ **HARMONISE FOR MULTIPLE RISKS DUE TO MULTIPLE HAZARDS**
CALCULATE THE **EXPECTED DAMAGES** | DEFINE A **COMMON DENOMINATOR**

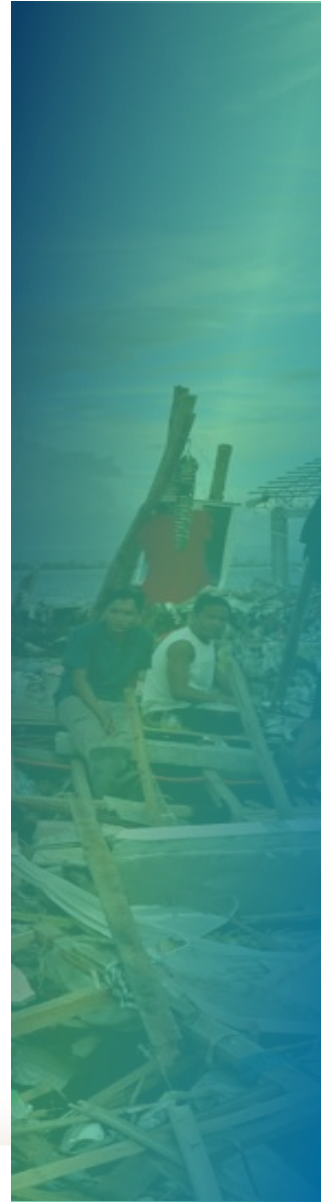
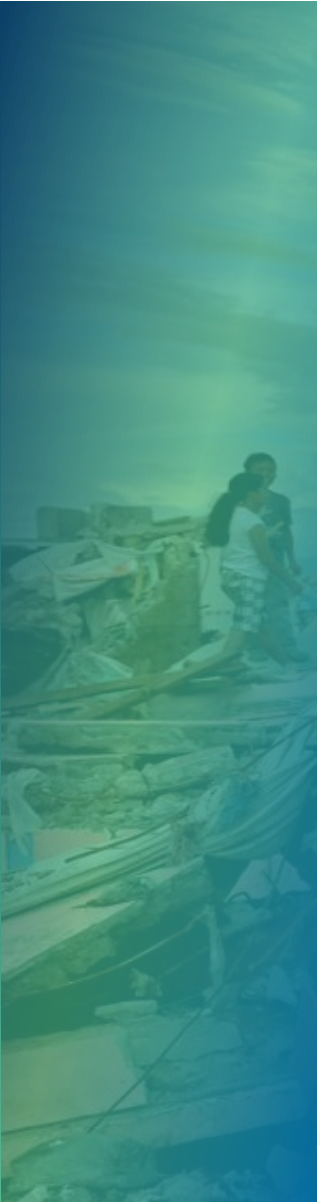
- **QUANTIFYING** the **EXPECTED DAMAGES** caused by hazards in **PERCENT OF VALUE PER YEAR**
- ‘Expected Damages’ **CAN** therefore **EASILY BE TRANSLATED** into any **OTHER VALUE** according to user requirements





OUTCOME – **WHAT DOES THE SUITABILITY MAP LOOK LIKE?**

- At first glance, a Suitability Map looks similar to a classic hazard map
- But
COLOUR-CODED INFORMATION provides **EXPECTED DAMAGES IN %** per year
- **EXAMPLE**





THE FINAL PRODUCT

MULTI-HAZARD SUITABILITY MAPS FOR RESIDENTIAL BUILDINGS IN THE PHILIPPINES

- EXAMPLE

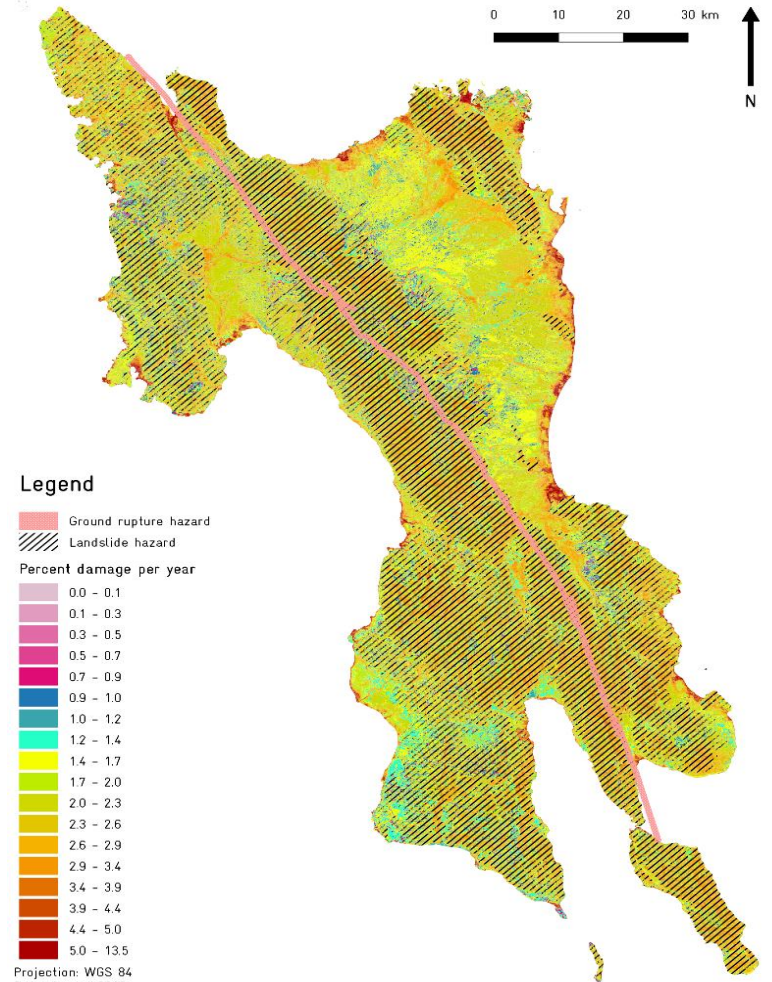
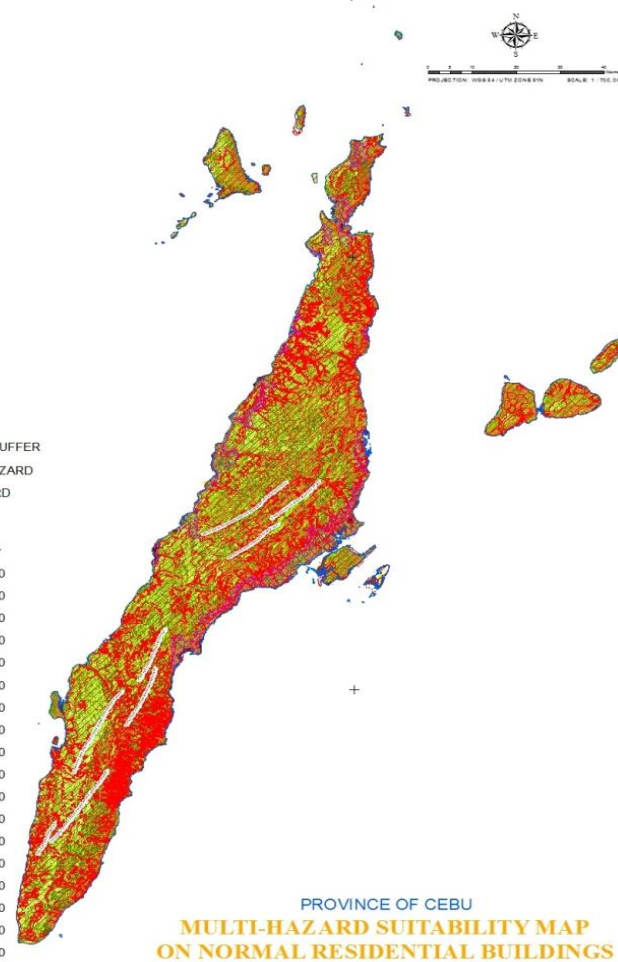


LEGEND:

- FAULTLINE
- 500m FAULTLINE BUFFER
- LIQUEFACTION HAZARD
- LANDSLIDE HAZARD
- SHORELINE

Percent Damage per Year

0.000000 - 0.100000
0.100001 - 0.300000
0.300001 - 0.500000
0.500001 - 0.700000
0.700001 - 0.900000
0.900001 - 1.000000
1.000001 - 1.200000
1.200001 - 1.400000
1.400001 - 1.700000
1.700001 - 2.000000
2.000001 - 2.300000
2.300001 - 2.600000
2.600001 - 2.900000
2.900001 - 3.400000
3.400001 - 3.900000
3.900001 - 4.400000
4.400001 - 5.000000
5.000001 - 8.000000



Projection: WGS 84
Date: August 2015
Calculations: Bastian Schneider
Map design: Olaf Neussner

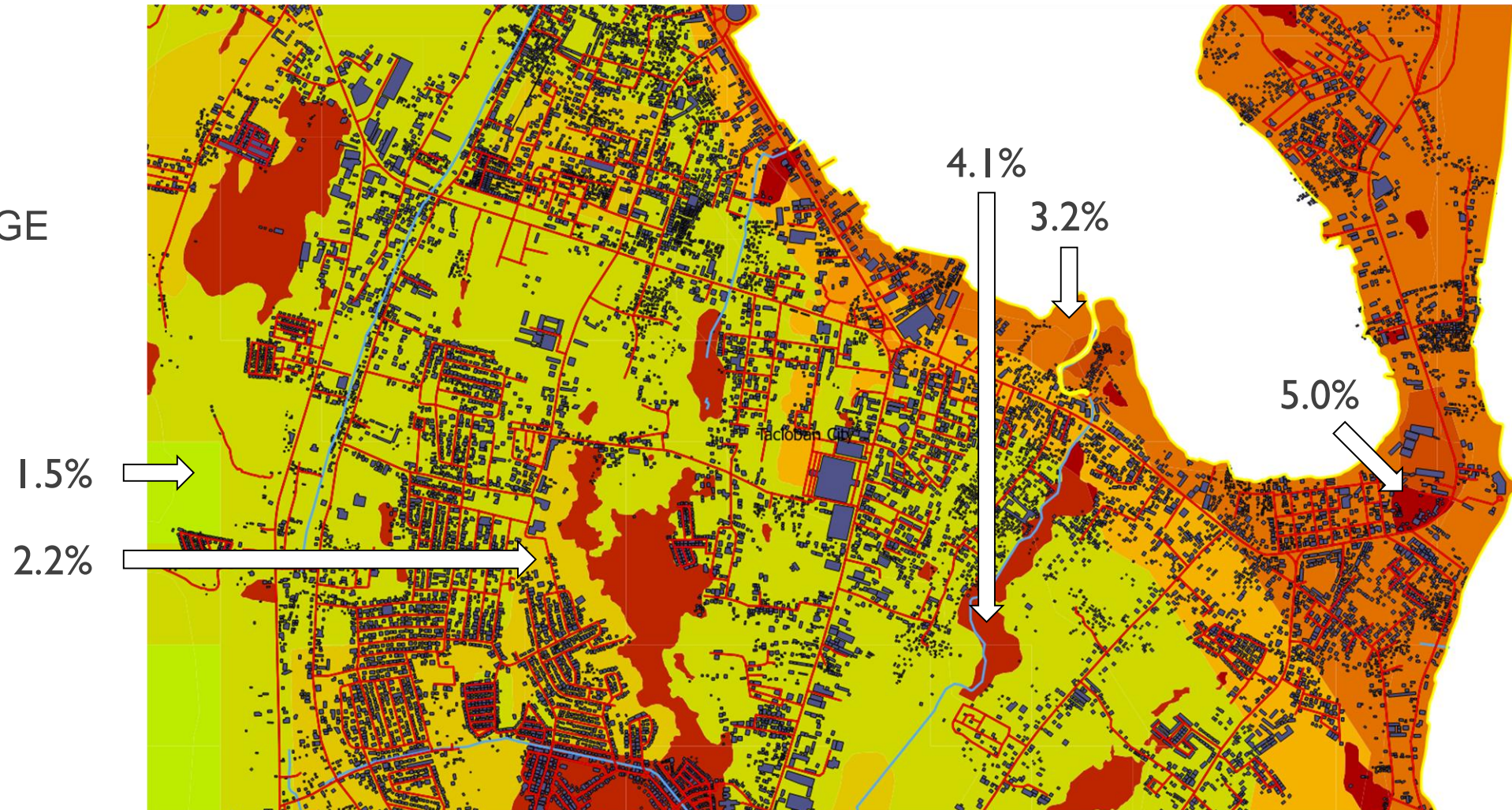


EXAMPLE 2

ZOOMED-IN

PERSPECTIVE

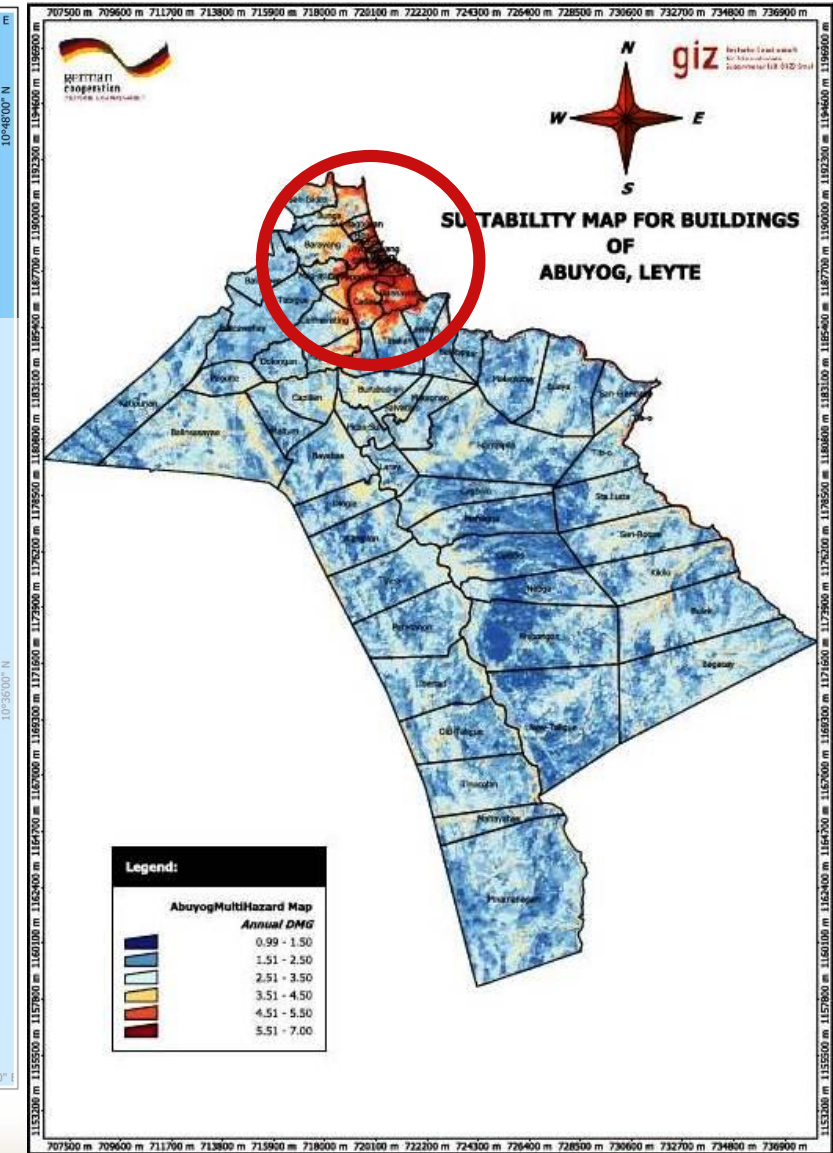
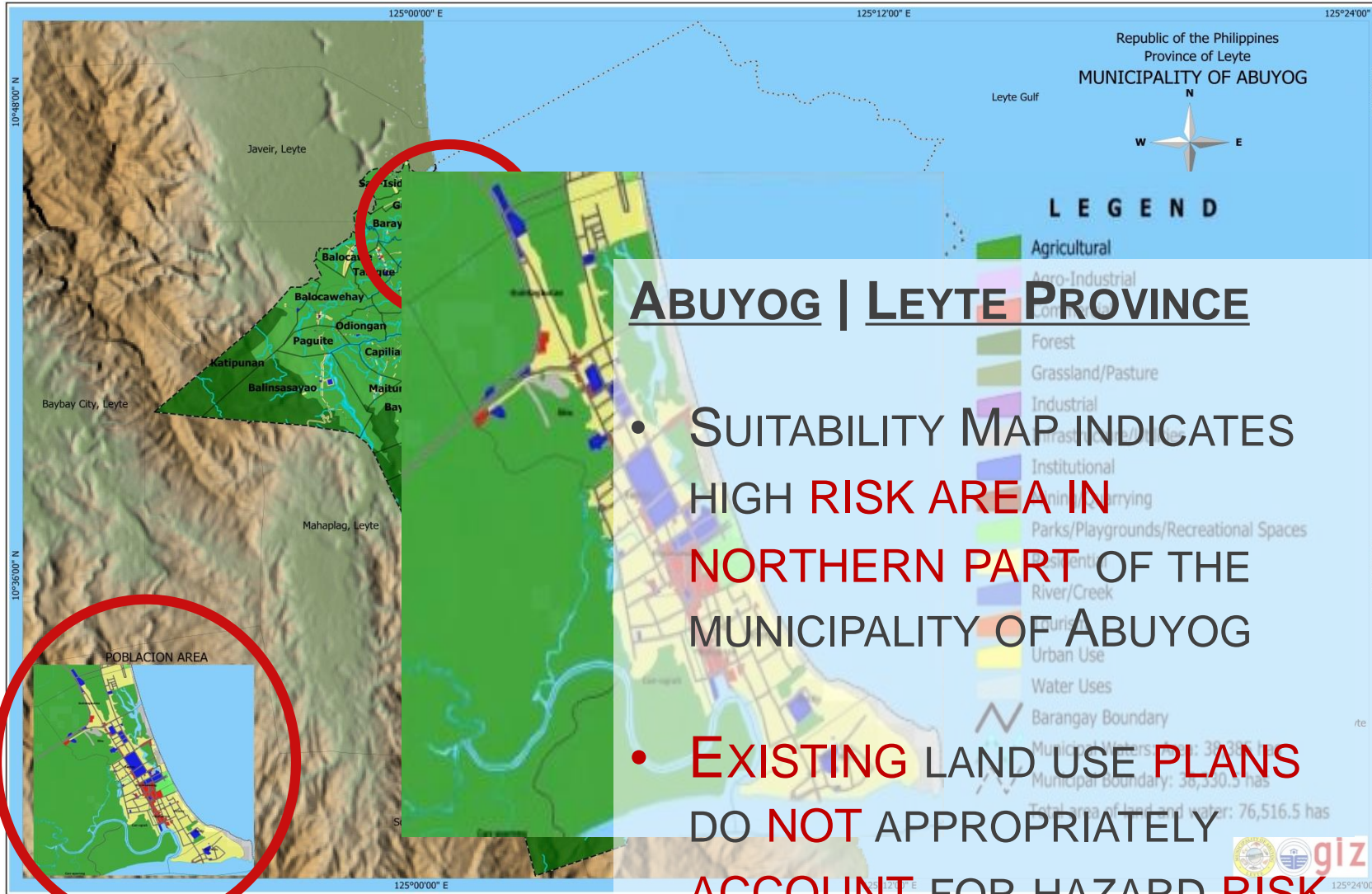
EXPECTED % DAMAGE
PER YEAR





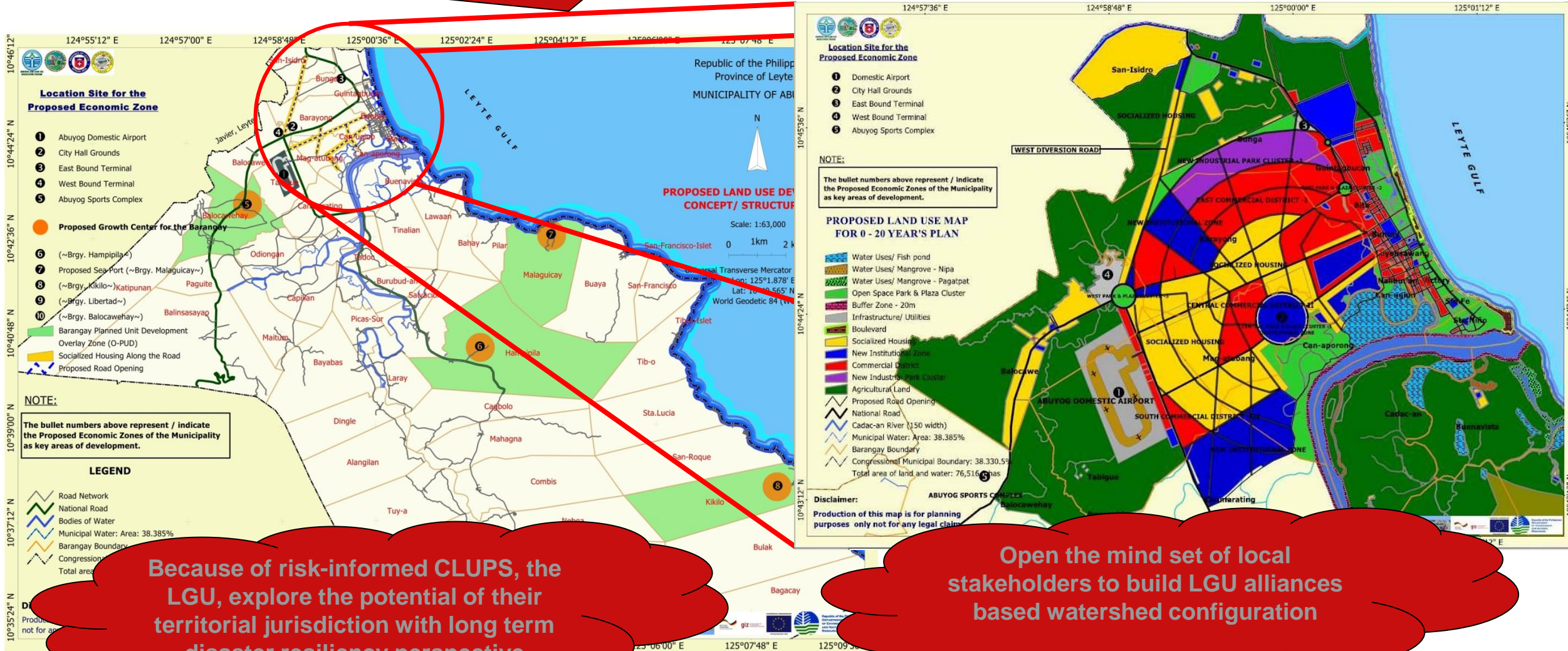
APPLICATION – HOW WILL DATA DERIVED FROM THE MODEL BENEFIT YOU?

- Allows for **STRATEGIC DECISION-MAKING**
- Allows for climate change and hazard **RISK INFORMED** land use **PLANNING** decisions
- Entails **PRECISE INFORMATION** regarding area-specific hazards, vulnerabilities, exposure and climate change projections **AND** the **IMPACT ON** specific types of **INFRASTRUCTURES**
- **EXAMPLE 1**



EXAMPLE 1

Re-classification of Land-use



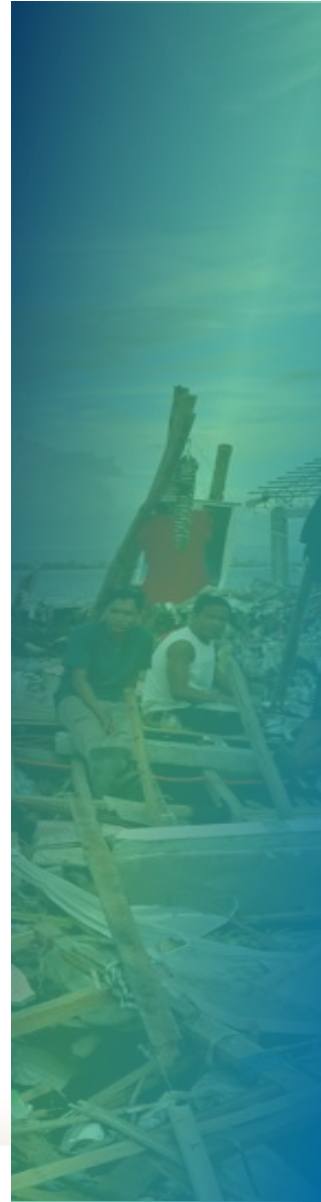
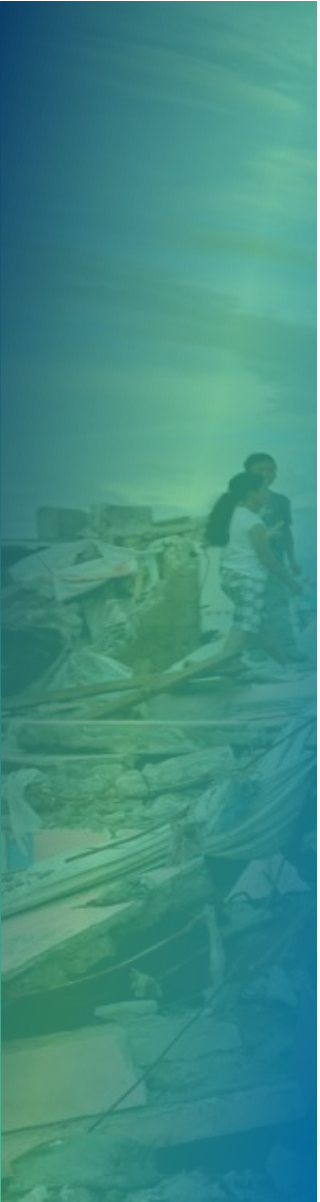
Because of risk-informed CLUPS, the LGU, explore the potential of their territorial jurisdiction with long term disaster resiliency perspective

Open the mind set of local stakeholders to build LGU alliances based watershed configuration



- EXAMPLE 2 | CEBU PROVINCE

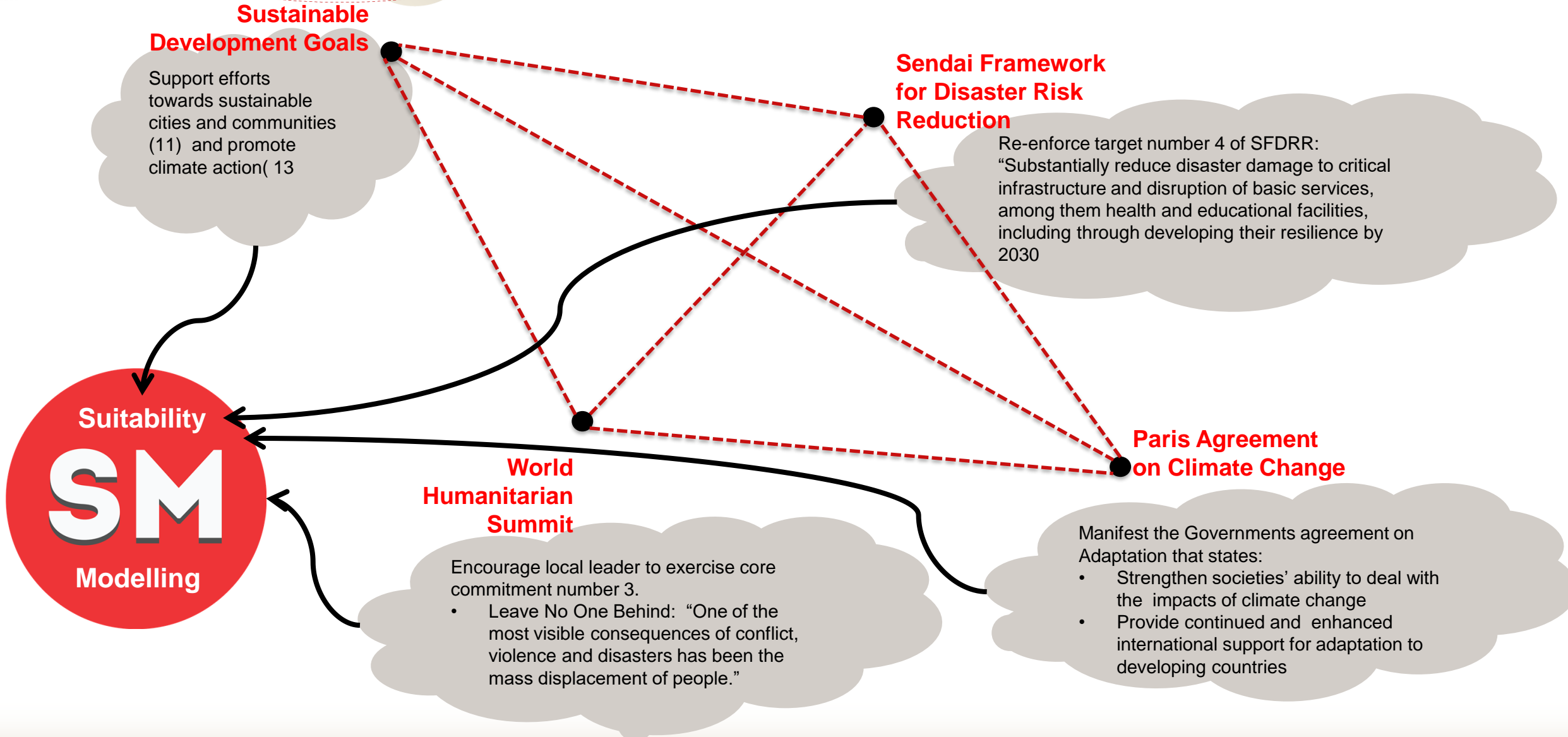
- Provincial LGUs in Cebu applied to **ACCESS FUNDS** through the **PEOPLE'S SURVIVAL FUND** of the Philippine Government
- Knowledge and application results from the **SUITABILITY MODEL** significantly **INCREASED CHANCE** to access 2 billion PHP or **40 MILLION US\$**





CONCLUSION

- There is no safe place on earth and also no place with infinite risk. What risk is acceptable, is up to people and their political representatives, but this might be considered;
- Especially vital installations (e.g. hospitals, rescue service, fire brigade, administrative building, etc.) should be in the safer places within a given area;
- Zoning ordinances can show where the safer area are located;
- Suitability map inform zoning ordinances;
- Suitability maps summarize and visualize the results of a risk assessment independent of the specific environment





THANK YOU FOR YOUR INTEREST

CONTACT INFORMATION

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