RiskChanges - An Open Source Tool for Multi-Hazard Risk Assessment and Decision Making

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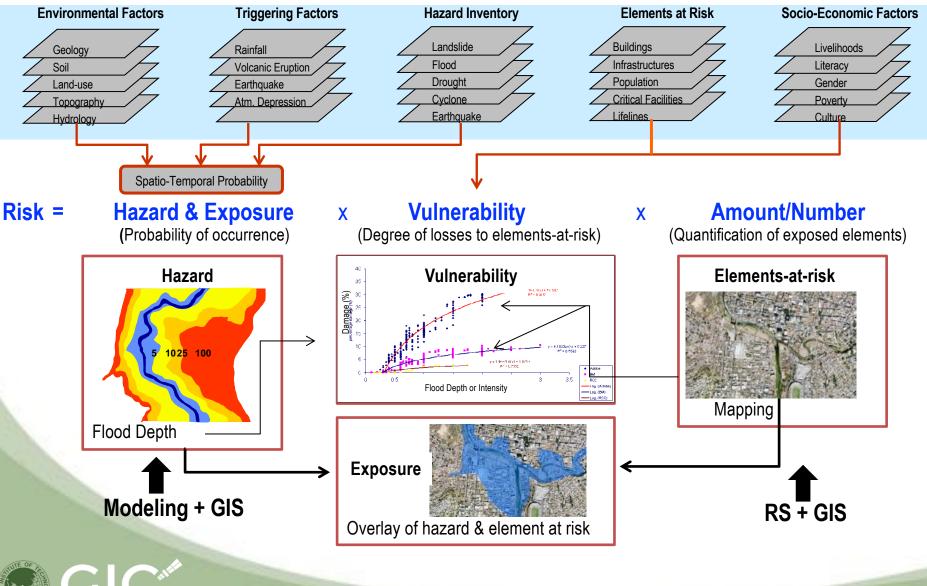
With inputs from

Prof. Cees van Westen Mr. Ashok Dahal

ITC, University of Twente, Netherlands

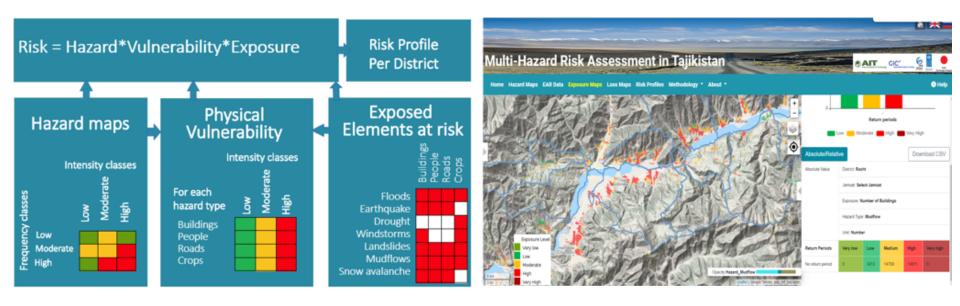


Spatial Representation of Multi-Hazard Risk



Multi-Hazard Risk Portal - Tajikistan

http://tajirisk.ait.ac.th/



Portal

- Risk profiles per administrative unit
- <u>Querying</u> hazard, exposure, loss and risk information

Further Requirements

- A <u>risk assessment tool</u> is required in-house;
- Data <u>updating</u> at local level;
- F<u>uture risk scenarios</u>

Motivation for Developing RiskChanges

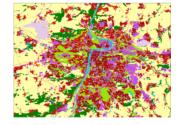
Short-comings in existing risk assessment tools:

- Non-availability of a true <u>multi-hazard risk</u> assessment software in opensource;
- Often too <u>complex</u> and data <u>intensive;</u>
- Many of them are <u>country or region</u> specific;
- Often lacking multi-hazard interactions;
- Often lacking <u>future scenarios</u> and <u>risk</u> <u>reduction</u> alternatives.



Workflow in RiskChanges









Data Input:

Exposure Analysis

Loss Analysis

Risk Analysis

• Annual Average Loss (AAL)

- Hazard Maps
- Elements at risk Maps
- Vulnerability Curves



Elements-at-Risk Module

SDSS Data Management * Modeling * Planning * Decision Making *

Element at Risk

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Current situation (S0)

Elements-at-Risk Module

Points

• Critical facilities.

Lines

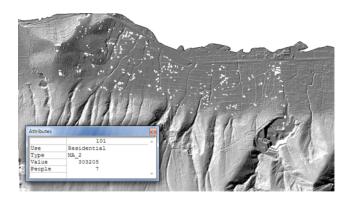
• Roads, utility lines (electricity, water etc.)

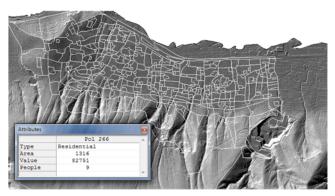
Building footprints

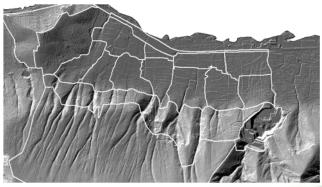
• Government, residential, commercial etc.

Land parcels

• Urban, agriculture, forest etc.









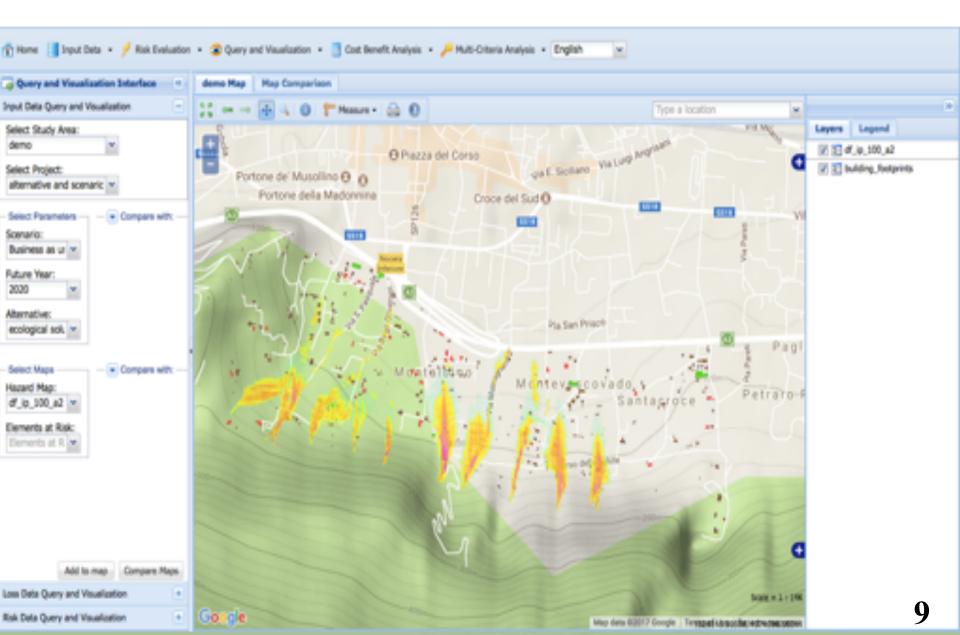
Hazard Module

You are active in the project Tajikistan Loss calculation. If you want to switch the project, go back to organization dashboard and choose another project.

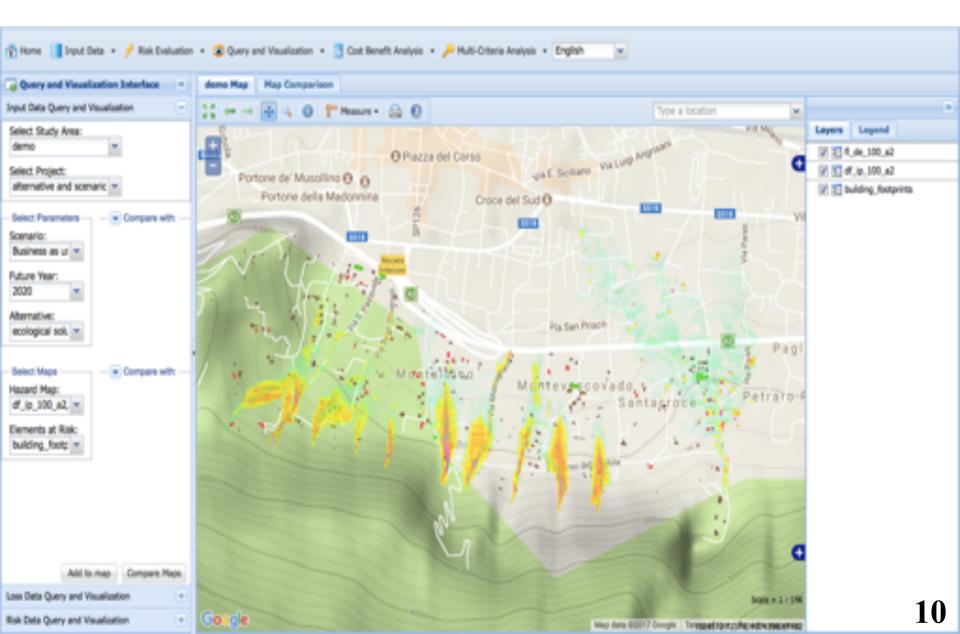
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Select hazard intensity	•	Select hazard intensity unit		
isk reduction alternative		Future scenario		
Current situation (A0)	٥	Current situation (S0)		
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Hazard Module - Debris Flow



Hazard Module - Debris Flow and Flood



Vulnerability Module

Vulnerability name	Vulnerability type	
Test	Physical	٥
Hazard type	Intensity type	
Select hazard type	\$ Select hazard intensity	\$
EAR type	EAR class	
Building footprints	\$ Building footprints	\$
Upload csv file of vulnerability		Browse

- III



More >>

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Vulnerability Module - Vulnerability Curves

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Risk Data Query and Yaualization 💿 13 1.2 1.3 0.5 None Intensity (m)	

Risk Assessment and Risk Reduction Alternatives

Alternatives	Measures	Hazard changes	Risk changes
Alternative 1: Engineering solutions	Engineering measures for: · Slope stabilization (Reinforcements) · Flood risk reduction (Embankments, storage tanks)	YES	PARTLY
Alternative 2: Ecological solutions	 <u>Ecological measures for</u>: Slope stabilization (plantation) Water harvesting structures 	YES	PARTLY
Alternative 3: Relocation	 Compensation, environmental and social safeguards etc. 	NO	YES

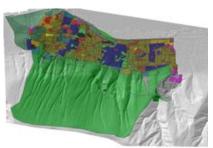


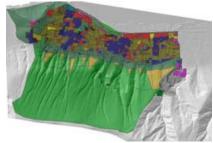
Decision Making – Risk Informed Planning

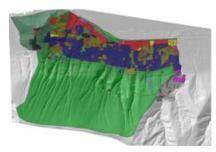
No risk reduction

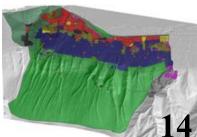
Alternative 1: **Engineering solutions**

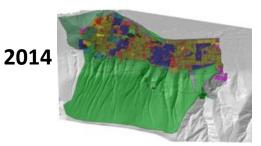
<u>Alternative 2</u>: **Ecological solutions** Alternative 3: Relocation

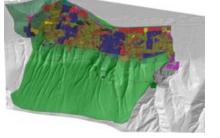


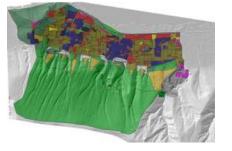




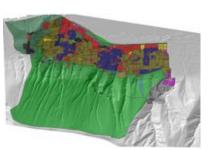


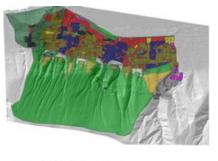


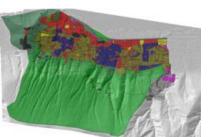


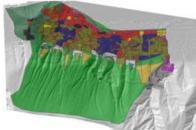


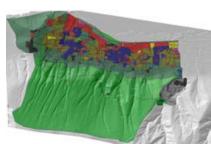


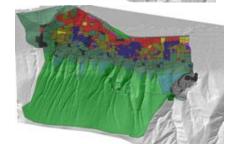












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Conclusions

- Multi-hazard risk assessment is the first and foremost requirement for identifying and prioritizing for risk reduction efforts;
- Existing risk assessment tools have <u>limitations</u> in terms of availability, useability, and complexity;
- RiskChanges is expected to address these issues and provide an opportunity for <u>risk-informed</u> planning and development.



Thank you for your kind attention

