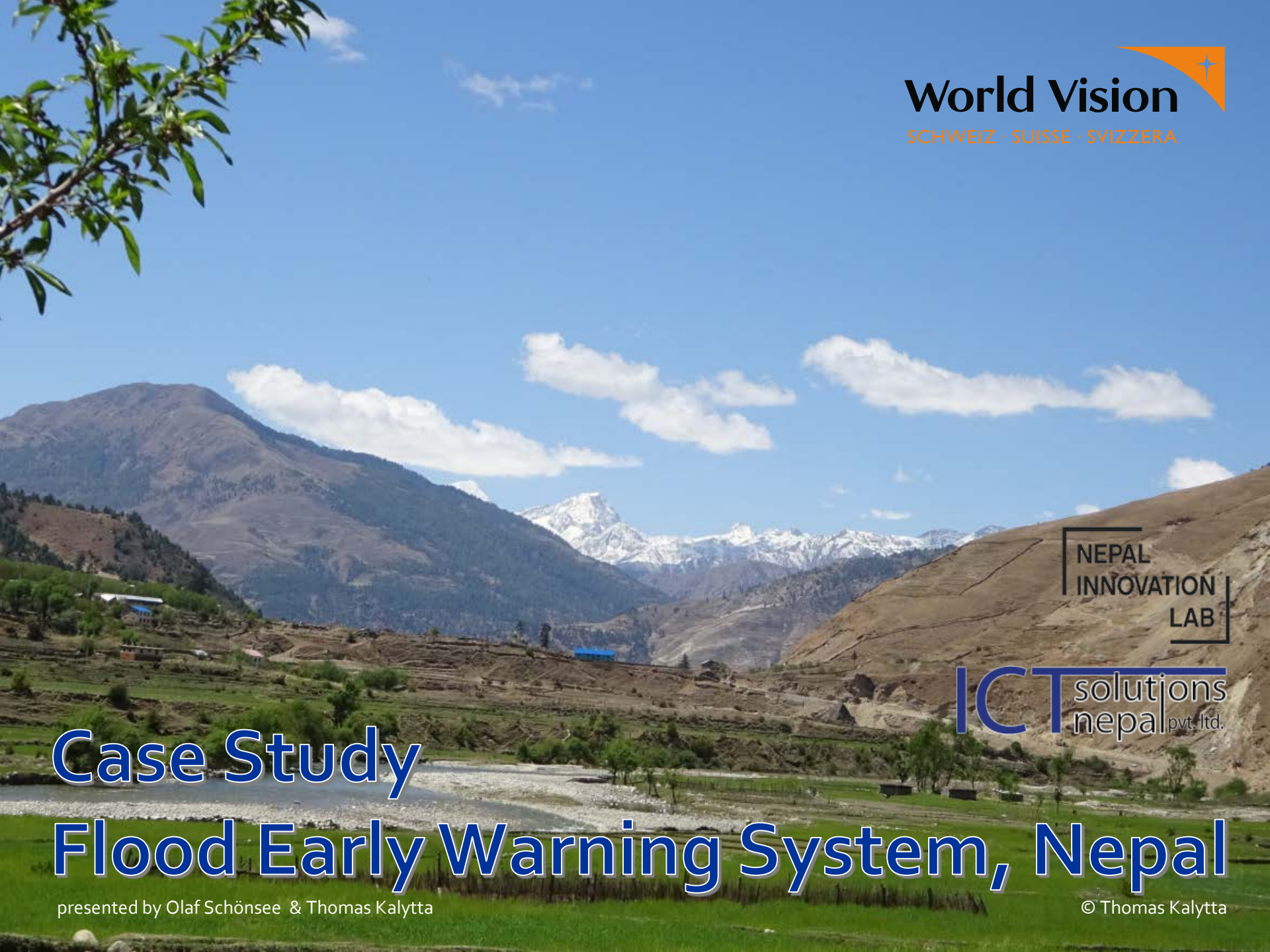

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NEPAL INNOVATION LAB

ICT solutions nepal pvt. ltd.

Case Study
Flood Early Warning System, Nepal

presented by Olaf Schönsee & Thomas Kalytta

© Thomas Kalytta

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CASE STUDY FROM NEPAL: PILOT ON EARLY WARNING AGAINST FLOODING?

CONTENT

01 Context Nepal
02 Project rational and interventions
03 Entry points for DRR
04 Good practices
05 Key factors of success

01

CONTEXT NEPAL

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CONTEXT: NEPAL – WHAT ARE THE MAIN HAZARDS?

Damage & loss by disasters in Nepal
1971 - 2015

Deaths
40,264

Incidents
22,372

Houses destroyed
1,330,913

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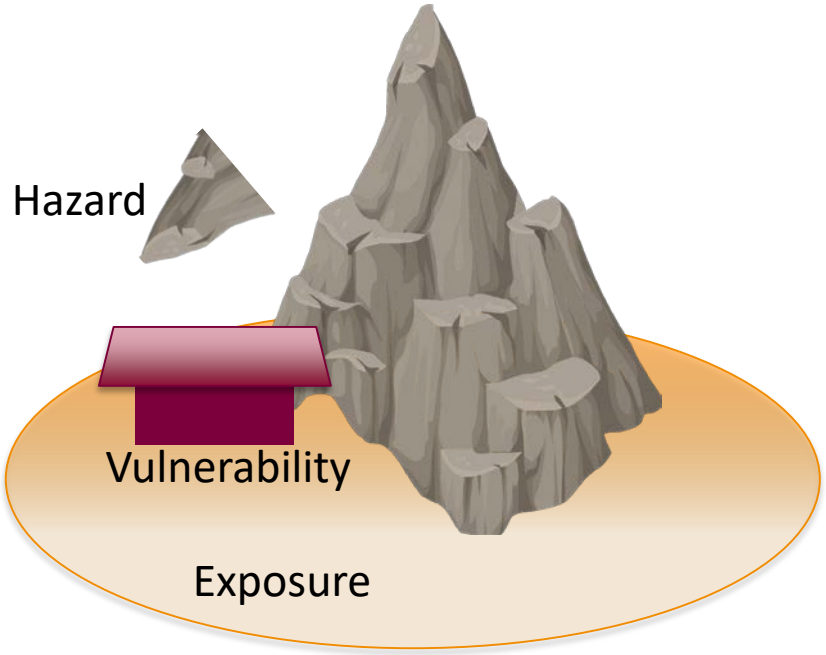
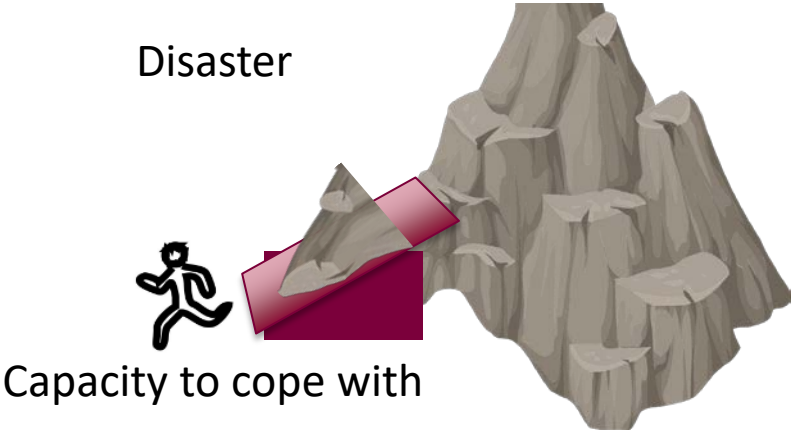
RISK FORMULA

$$\text{Risk of a disaster} = \frac{\text{Hazard x Exposure x Vulnerability}}{\text{Capacity}}$$





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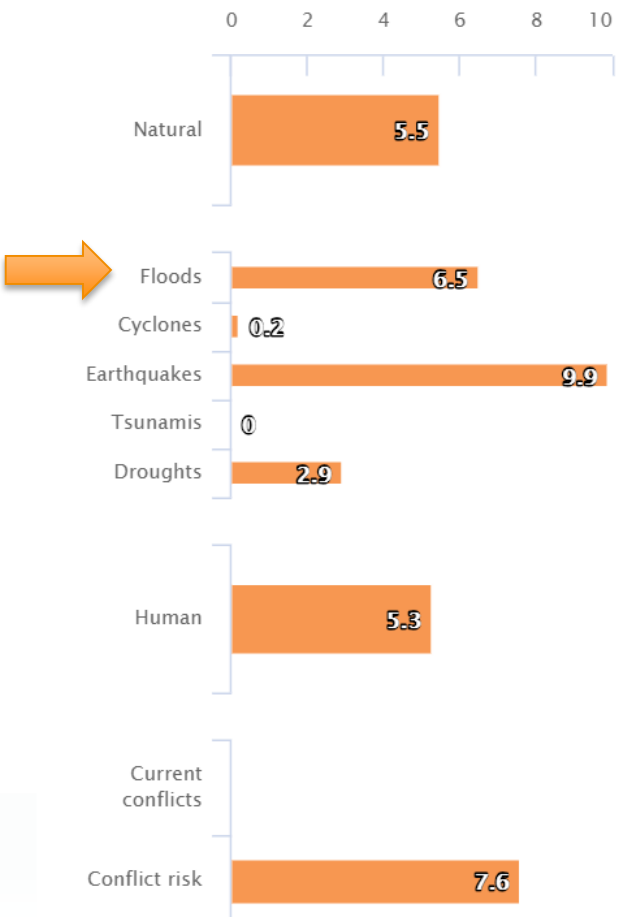
NEPAL – PRONE TO MANY DISASTERS – INFORM GLOBAL RISK ANALYSIS

RISK DIMENSIONS AND COMPONENTS

Hazard & Exposure



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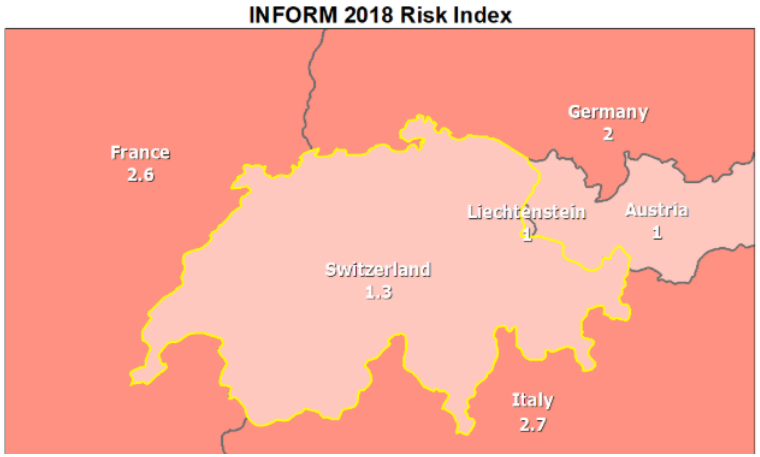
NEPAL RISK INDEX COMPARED WITH SWITZERLAND

SWITZERLAND

Western Europe
High income

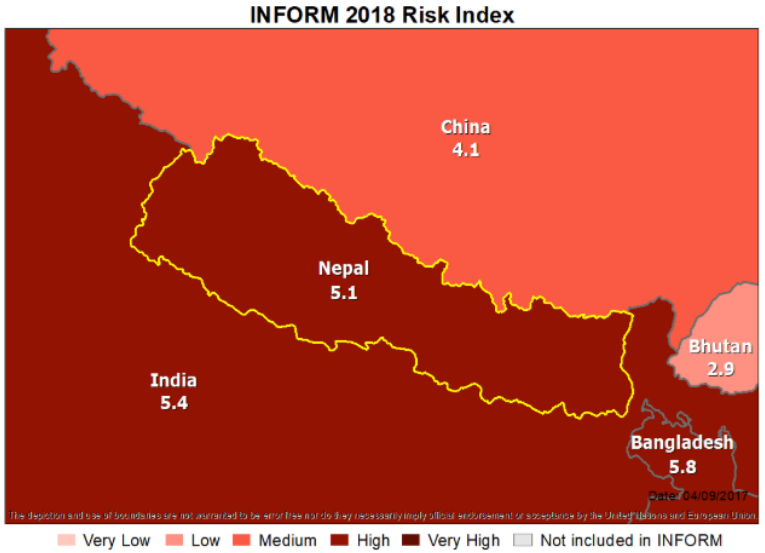
	Value	Rank	Trend
INFORM Risk	1.3	178	–
Hazard & Exposure Floods 4.3	1	173	–
Vulnerability	2.2	129	–
Lack of Coping Capacity	0.9	191	–



NEPAL

Southern Asia
Low income

	Value	Rank	Trend
INFORM Risk	5.1	43	–
Hazard & Exposure Floods 6.5	5.4	42	–
Vulnerability	4.2	70	–
Lack of Coping Capacity	5.9	52	–



FLOOD-RELATED INCIDENTS 2013-2018

Nepal in Data
nepalindata

	No. of Deaths	No. of Missing People	No. of Affected Families	No. of Injured Persons
2013 -2017	1099	533	66042	618
2018*	85	6	1082	82

	No. of Private Houses Fully Damaged	No. of Private Houses Partially Damaged	No. of Cattle Lossed	No. of Displaced Sheds
2013 -2017	10932	39405	4430	225
2018*	139	317	195	5

Estimated Loss in Rs. Million	2013 -2017	2018*
	16255	81

= 136 Mill CHF

* as of July 29, 2018

Source: Government of Nepal, Nepal Disaster Risk Reduction Portal

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NEPAL – PRONE TO MANY DISASTERS – HUMAN TOUCH STORY

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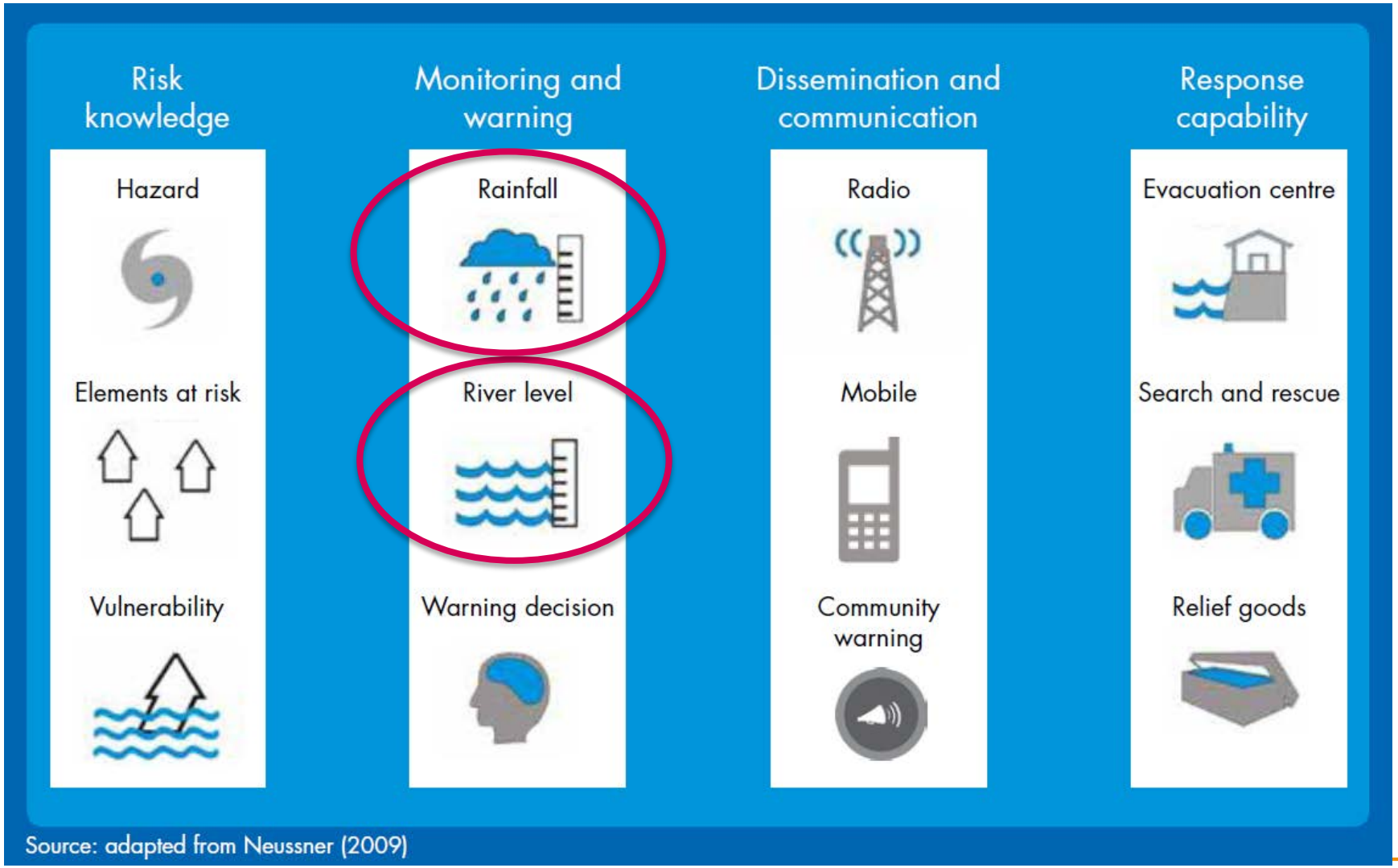
COMPONENTS OF A FLOOD EARLY WARNING SYSTEM



02

PROJECT INTERVENTIONS

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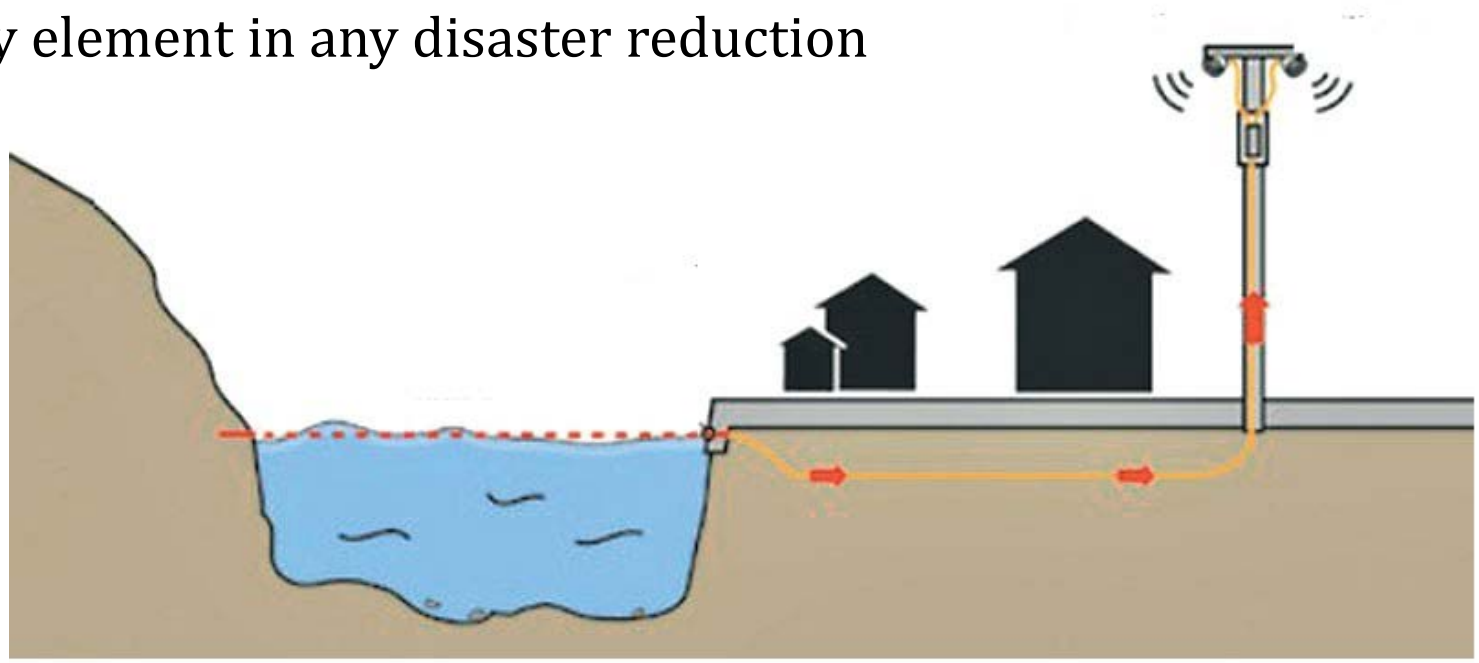
PROJECT INTERVENTIONS

EARLY WARNING SYSTEM

GENERAL

- EWS: protect lives (and property) and infrastructure.
- EWS: key element in any disaster reduction strategy



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PROJECT INTERVENTIONS

Present situation:

- **Manual** levels:

  People reading river levels at the river bank; reading rain gauge levels and

  - information being passed <u>verbally</u> downstream

- **Broken** electronic devices
  - nobody knows how to repair

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PROJECT INTERVENTIONS

STATUS TO DATE:

- Development of a web-based system to provide flood warnings
- more than 40 automatic stations have been installed.

- Transmittal of **real time data** = timely warning
- automatic sensors (pressure/radar) transmit via CDMA/GSM technology
- The Iridium satellite = backup

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PROJECT INTERVENTIONS

Nepal Innovation Lab
Set- up in 2015 by World Vision International Nepal to provide solutions for humanitarian development challenges.

NEPAL INNOVATION LAB

facebook.com/nepalinnovationlab

Overall project goal:

- ***Resilience*** of ***local*** government and communities
  (i.e. strengthened capacities in local DRM)
- ***Cost effective*** flood early warning system (EWS)
- ***Community owned***
- ***Contribute*** to the larger national flood EWS

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PROJECT INTERVENTIONS

PHASE 1

System requirement analysis and context specific system design.

PHASE 2

Production, assembly and installation of the system.

PHASE 3

Monitoring and evaluation of the installed system and local level training for the operation and maintenance of the system.

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PROJECT INTERVENTIONS

- ISO certified components
- Solar powered (80W), with battery (35Ah)

1 system consists of
1 unit of ultrasonic radar,
1 unit of rain gauge and
1 unit of data logger (Raspberry Pi, **dual GSM**).

Costs:

- **1 system = 160'300 NPR = 1'350 CHF**
- **repair and maintenance** ca. **150 CHF**/ system/a (changing the battery and checking solar panels)
- **transfer of ownership to DHM** esp. for future maintenance and repairs

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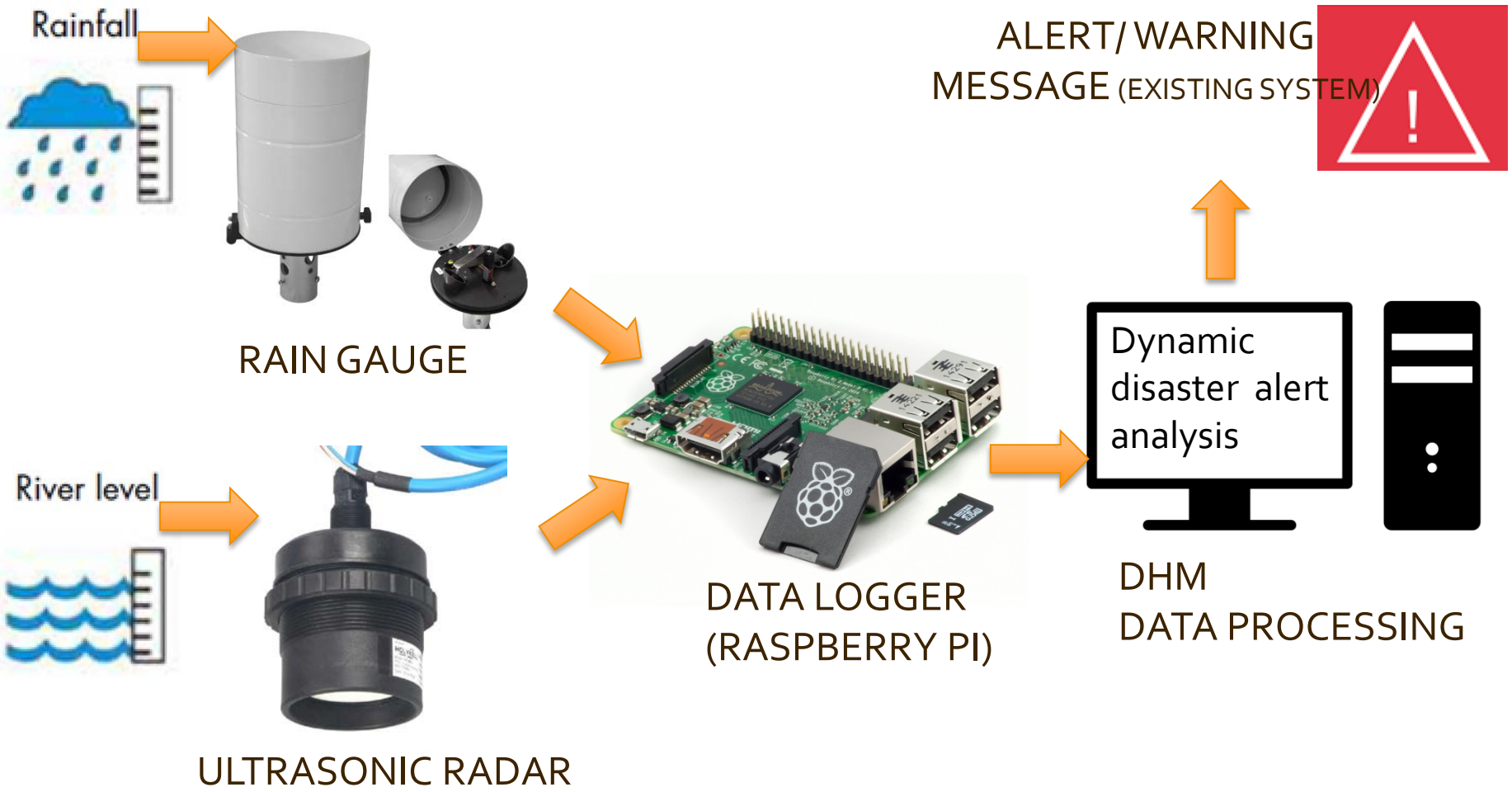
PROJECT INTERVENTIONS



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PROJECT INTERVENTIONS

hydrology.gov.np

Government of Nepal
Ministry of Energy, Water Resources and Irrigation
Department of Hydrology and Meteorology
Hydrology Division | Flood Forecasting Section

HOME | REAL TIME DATA | RIVER WATCH | RAINFALL WATCH | CURRENT FORECAST | FLOOD HAZARD MAP | COMMUNITY OUTREACH | PROJECTS | PUBLICATIONS

Notice

- Flood Bulletin 07September_6AM (भाद्र २२)
- Flood Bulletin_06 September_6AM (भाद्र--२१)
- Flood Bulletin 05_September_6AM (भाद्र-२०)
- Flood Bulletin_04 September_6AM (भाद्र--१९)
- Flood Bulletin 03_September_6AM (भाद्र १८)
- Flood Bulletin_02 September_6AM (भाद्र--१७)
- Flood Bulletin 1_September_6AM (भाद्र-१६)
- Flood Bulletin_31 August_6AM (भाद्र--१५)

News and Events

Important Links

NWP Products

- Below Warning Level and Steady
- Above Warning Level and Steady
- Above Danger Level and Steady
- Below Warning Level and Rising
- Above Warning Level and Rising
- Above Danger Level and Rising
- Below Warning Level and Falling
- Above Warning Level and Falling
- Above Danger Level and Falling

Government of Nepal started hydrological and meteorological activities in an organized way in 1962. The activities were initiated as a section under the Department of Electricity. The section was subsequently transferred to the Department of Irrigation and Department

River Watch see all

Mahakali at Darchula (Dattu)	0.563 m ↓
Mahakali at Parigaon	4.713 m
Humla Karnali at Lalighat	4.01 m
Sinja Khola at Diware	2.355 m
Tila Nadi at Serighat	3.301 m
Karnali at Asaraghat	5.714 m
Lohare Khola at Dailekh	1.147 m
West Seti at Gopaghat	2.547 m

Rainfall Watch see all

	1 HR	3 HR	6 HR	12 HR	24 HR
Achham at Safebagar	0 mm				
Lohare Khola at Tallo Dungeshwor	-				
Budiganga at Chitreghat	-				
Thulo Bheri at Rimna	0 mm				
Bheri at Samijighat	-				
Karnali at Chisapani (Rainfall)	0 mm				

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PROJECT INTERVENTIONS

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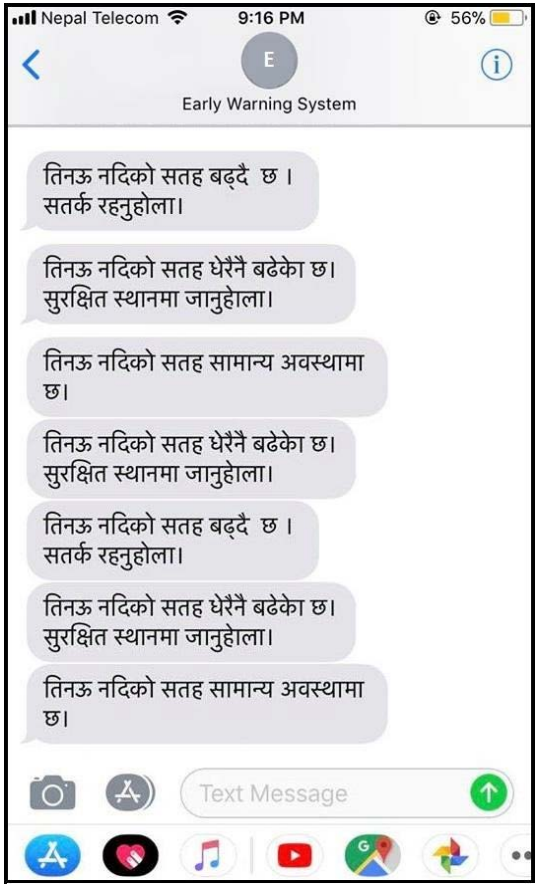
PROJECT INTERVENTIONS



ALERT MESSAGES

Type I: Normal stage

Type II: Raising, stay alert

Type III: Raised, find the secure place

to DHM system has been provided

03

ENTRY POINTS FOR DRR

LEARNING EV

ENTRY POINT

Regulatory Framework	Types of Disaster					Level of Governance			Phases of Disaster Cycle		
	Flood and Landslide	Earth- quake	GLOF/ Avalanche	Fire	Epidemic	National/ Federal	Regional/ Province	Local	Preparedness	Response	Rehabilitation and mitigation
Soil and Watershed Conservation Act (1982)	■					■			■	■	
Water Resource Act (1992)	■					■			■		
The Forest Act (1993)				■		■			■		
National Building Code (1994)		■		■		■		■	■		
Environment Protection Act (1996)	■			■		■			■		
The Building Act (1998)		■		■		■		■	■		
Prime Minister Relief Fund Regulation (2007)	■	■	■	■	■	■		■		■	
Constitution of Nepal (2015)	■	■	■	■	■	■	■	■	■	■	■
Local Government Operation Act (2017)	■	■		■	■	■		■	■	■	■
Disaster Risk Reduction and Management Act (2017)	■	■	■	■	■	■	■	■	■	■	■

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ENTRY POINTS FOR DRR

The Local Government Operation Act (LGOA) 2017:

- Local level policies, legislation, standards, plan implementation, monitoring and evaluation related to **disaster management**;
- Disaster **preparedness and response** plan, **early warning system**, **search and rescue**, advance store of relief materials, distribution and coordination at local level;
- Local embankment**, river and landslide control,** river management and evaluation;
- **Hazard mapping** and identification of settlements at risk and transformation;
- **Coordination** between federal, state and local level and local community organizations and coordination with private sector in order to disaster management;
- Establishment of **disaster management fund** and operation and utilization of resources;
- Plan formulation, implementation, monitoring and evaluation **for disaster risk reduction**;
- **Resettlement** and **rehabilitation** after disaster;
- **Data management** and study and research about local level disaster;
- Development of local **emergency work operation system**; and
- Implementation of **community based disaster management**.

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ENTRY POINTS FOR DRR

- WV Nepal earned a lot of credits during the EQ response, being a reliable reputable partner
- Close cooperation with the Department of Hydrology and Meteorology (DHM)
- Joint selection of the river installation sites
- Data link to the DHM's server and early warning dashboard
- Capacity building of local Gov. & DRM Committees
- EWS is just one piece of strengthening the local structures

04

GOOD PRACTICES

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GOOD PRACTICES & TOOLS

- **Ownership:**

  Joint development w. government & local bodies

- **Plug and play** system

  O& M at local level.

- **Technology:**

  Adhere to government standards, sourced locally (ISO certified).

- Purpose:

  Design **strengthens** the **existing** EWS.

05

KEY FACTORS OF SUCCESS

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3 KEY FACTORS OF SUCCESS

Three Key factors of success:

1) The EWS is owned by the Local Government bodies.
2) It strengthens & fits into the existing National Flood Early Warning System.
3) Communities are empowered to act in sufficient time and in appropriate manner.

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Questions?