



## A community flood resilience measurement tool

**Adriana Keating**  
**Research Scholar**  
**IIASA Risk and Resilience Program**



## A development-centered approach to disaster resilience

**Community flood resilience:** The ability of a community to continue to support development and wellbeing in the face of floods.

**Disaster Resilience:** the ability of a system, community, or society to pursue its social, ecological, and economic development and growth objectives, while managing its disaster risk over time in a mutually reinforcing way.

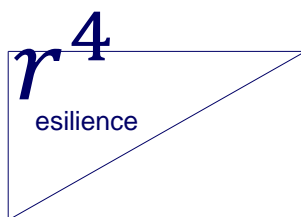


## Sources and Outcomes: The Two Time Frames of Resilience

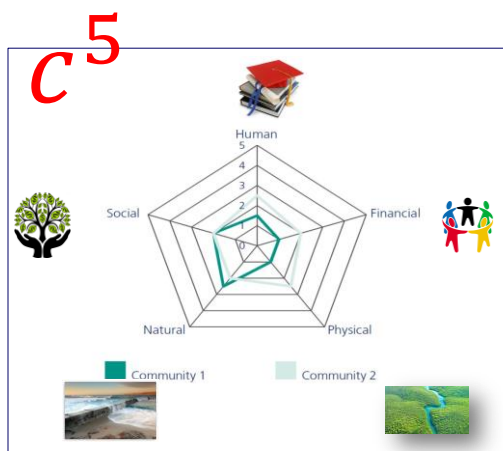
- 1. Before a crisis or risk event:** Resilience is a latent characteristic of a community. **Sources of Resilience.**
- 2. After the crisis or risk event:** Actual characteristic resilience is revealed in the systems ability to withstand or quickly bounce back from and learn and positively transform from the risk event. **Outcomes.**



### Comprehensive approach to measure sources of resilience



- Robustness
- Redundancy
- Resourcefulness
- Rapidity



## Identifying Sources of Resilience

- ✓ **Human:** if educational attainment is a goal, are there plans in place to get children back to school ASAP?
- ✓ **Social:** if maintaining cohesion is a goal, are there plans in place to help vulnerable people during floods?
- ✓ **Physical:** if maintaining roads and buildings is a goal, are they built to flood specification?
- ✓ **Natural:** if maintaining ecosystem services (including natural flood protection) is a goal, are there systems to ensure these are not being degraded?
- ✓ **Financial:** If maintaining income is a goal, are there alternative livelihoods or sources of income which are less vulnerable to the affects of flooding?

## Multiple perspectives

5Cs and 4Rs but ALSO:

### Theme:

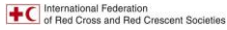
- Life and Health
- Education
- Assets and Livelihoods
- Food
- Transport and Communication
- Water
- Waste
- Energy
- Governance
- Natural environment

### DRM cycle phase:

- Crisis preparedness
- Coping
- Reconstruction
- Prospective risk reduction
- Corrective risk reduction

### Context:

- Community context
- Enabling environment



**Where do we get the data?**

Source	Data points	Method to gather the data
Access to school facilities	-Does school take place during and after flood events? -Has the school facility been damaged during the last floods so it could not operate anymore? -Can all reach the school facility during flooding?	-Household interviews -Community meetings -Key informant interviews -Interest group discussions -Third party information
Access to healthcare		..
Water supply		..
Food security	..	..
Etc.	..	..



**Assessing the sources**

*Example from financial capital group:*

Household financial savings that protect long term assets

A	B	C	D
Households have a financial buffer expressly for flood recovery that is adequate to cover their expected losses. Very liquid and good store of value	Households have some financial buffer expressly for flood recovery but it is insufficient to cover their expected losses. Very liquid and good store of value	Households have some financial buffer but it is not expressly for flood recovery and is often used for alternative expenses. Insufficient to cover expected losses. Very liquid and good store of value	Households have no financial reserve for flood losses and do not hold any contingent contracts to a reserve of financial capital.



## Evolution of the framework 2013 - now

- ✓ Pilot testing
- ✓ Refining
- ✓ More pilot testing
- ✓ Expert / peer review workshop
- ✓ More refining



## 88 Sources of Resilience

	Household survey	Community discussion	Key informant	Interest group	3rd party source
Sources	Household Allowed Assesst	Community Allowed Assesst	Key Informant Allowed Assesst	Interest Group Allowed Assesst	3rd party source Allowed Assesst
<p><b>Complement local safety net</b></p> <p>Does the local government have money available to help those harmed by flood emergencies?</p> <p>If a flood occurs, are households can get money or supplies from the local government (or community org)?</p> <p>If a flood occurs, this community has a way to share resources to help those in need.</p>	<p>1- The local government has a fund set aside for flood emergencies?</p> <p>2- The local government has a fund for flood emergencies but it is not set aside (funding is uncertain)?</p> <p>3- The local government has no flood emergency fund</p> <p>4- I don't know</p>	<p>Does the local government have money available to help those harmed by flood emergencies?</p> <p>1- The local government has a fund set aside for flood emergencies?</p> <p>2- The local government has a fund for flood emergencies but it is not set aside (funding is uncertain)?</p> <p>3- The local government has no flood emergency fund</p> <p>4- I don't know</p>	<p>Does the local government have money available to help those harmed by flood emergencies?</p> <p>1- The local government has a fund set aside for flood emergencies?</p> <p>2- The local government has a fund for flood emergencies but it is not set aside (funding is uncertain)?</p> <p>3- The local government has no flood emergency fund</p>	<p>Does the local government have money available to help those harmed by flood emergencies?</p> <p>1- The local government has a fund for flood emergencies but it is not set aside (funding is uncertain)?</p> <p>2- The local government has no flood emergency fund</p>	<p>Provides statistics on local social safety nets for flood emergencies.</p> <p>From form</p>
<p><b>Indicators</b></p>	<p>1- Yes</p> <p>2- No</p> <p>3- I don't know</p>	<p>1- Yes</p> <p>2- No</p> <p>3- I don't know</p>	<p>1- Yes</p> <p>2- No</p> <p>3- I don't know</p>	<p>1- Yes</p> <p>2- No</p> <p>3- I don't know</p>	<p>1- Yes</p> <p>2- No</p> <p>3- I don't know</p>



## 88 Sources of Resilience

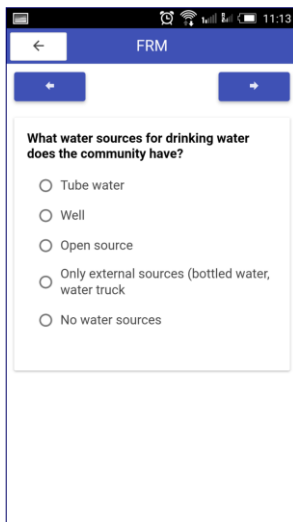
A-D grading                      4Rs                      Community vs enabling enviro.                      DRM cycle                      Theme                      5Cs

A	B	C	D	4R	Context	DRM cycle	Theme	5Cs
Community has access to local level flood emergency funds. The distribution channels for these funds are well known and there are efficient ways (minimal bureaucracy) to get the funds; the funds are disbursed fairly and ensure that the most vulnerable have access	Community has some access to flood emergency funds. Those that are available are difficult to access but are fairly distributed	Community has some access to flood emergency funds but it is difficult to access and only available to the most powerful	There are no local flood emergency funds set aside for floods or if funds are set aside they are only accessible to the most powerful.	Rapidly	Community level	Coping	Life and Health	Financial
Notes for assessment criteria - This source looks at financial protections at the local level. This is again financial protection specifically set aside or contingent on flood. Include provision from local government, local religious organizations, community emergency funds etc.								

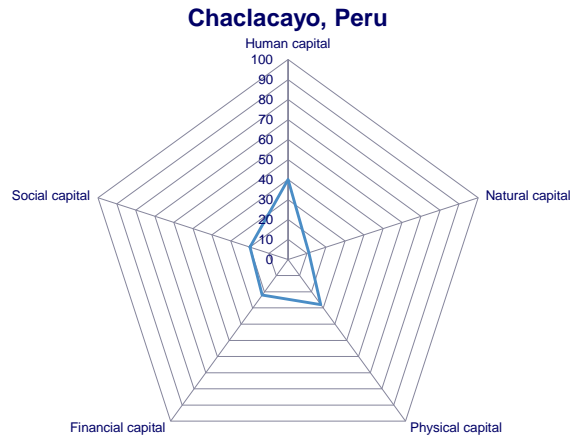
Rationale/guidance                      PAGE 2.



## Technology platform



1. Assign data collection to field staff.
2. Field staff collect data via mobile devices.
3. System sends data back to web portal.
4. Assessors do grading within the web portal using data collected by field staff.
5. Auto-generates descriptive statistics and graphical results.



Sources displayed by capital group

## Outcome measures

- Flood frequency and severity
- Number of people impacted
- Flood duration
- Death and injury due to flooding
- Building losses and damage
- Property losses and damage
- Prevalence of post-flood illness
- Healthcare provision
- Education provision
- Income stability
- Business interruption
- Food security
- Communications infrastructure
- Road and transportation infrastructure
- Road and transportation infrastructure
- Clean water
- Sanitation
- Waste disposal
- Electricity
- Social cohesion
- Property crime and looting
- Natural environment
- Flood learning
- Early warning system function
- Preparatory actions
- External flood assistance
- Legal and regulatory constraints
- Selling assets
- Risky livelihoods
- Insurance

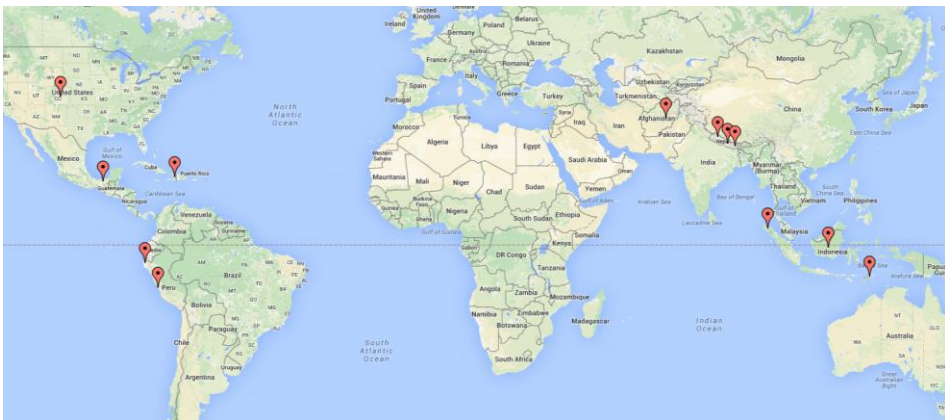
## Who uses the tool and does the assessment?



Measurement “train the trainer” workshop

- ✓ **Must be trained!**
- ✓ NGO staff
- ✓ Community organizers
- ✓ Municipalities

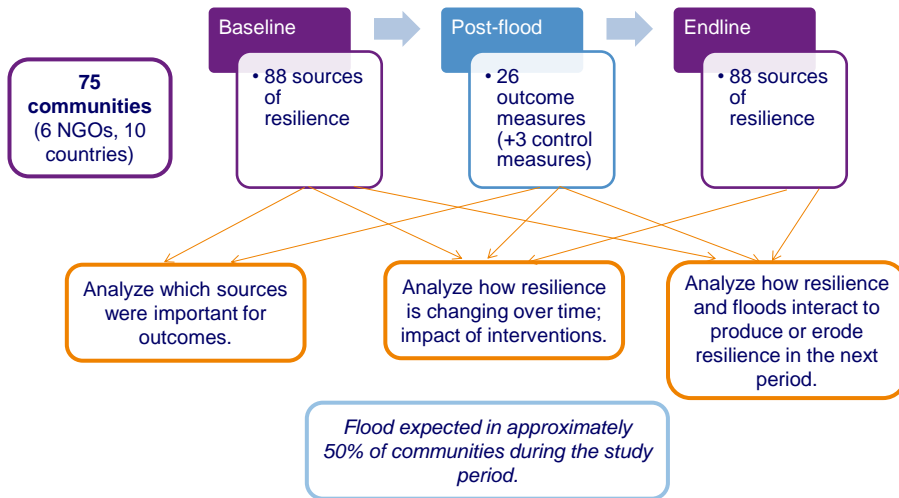
## Community programs where measurement tool will be applied







## Matching sources and outcomes



**Thank you for your attention!**

**Adriana Keating**  
**Risk and Resilience Program**  
**International Association for Applied Systems Analysis**  
*keatinga@iiasa.ac.at*