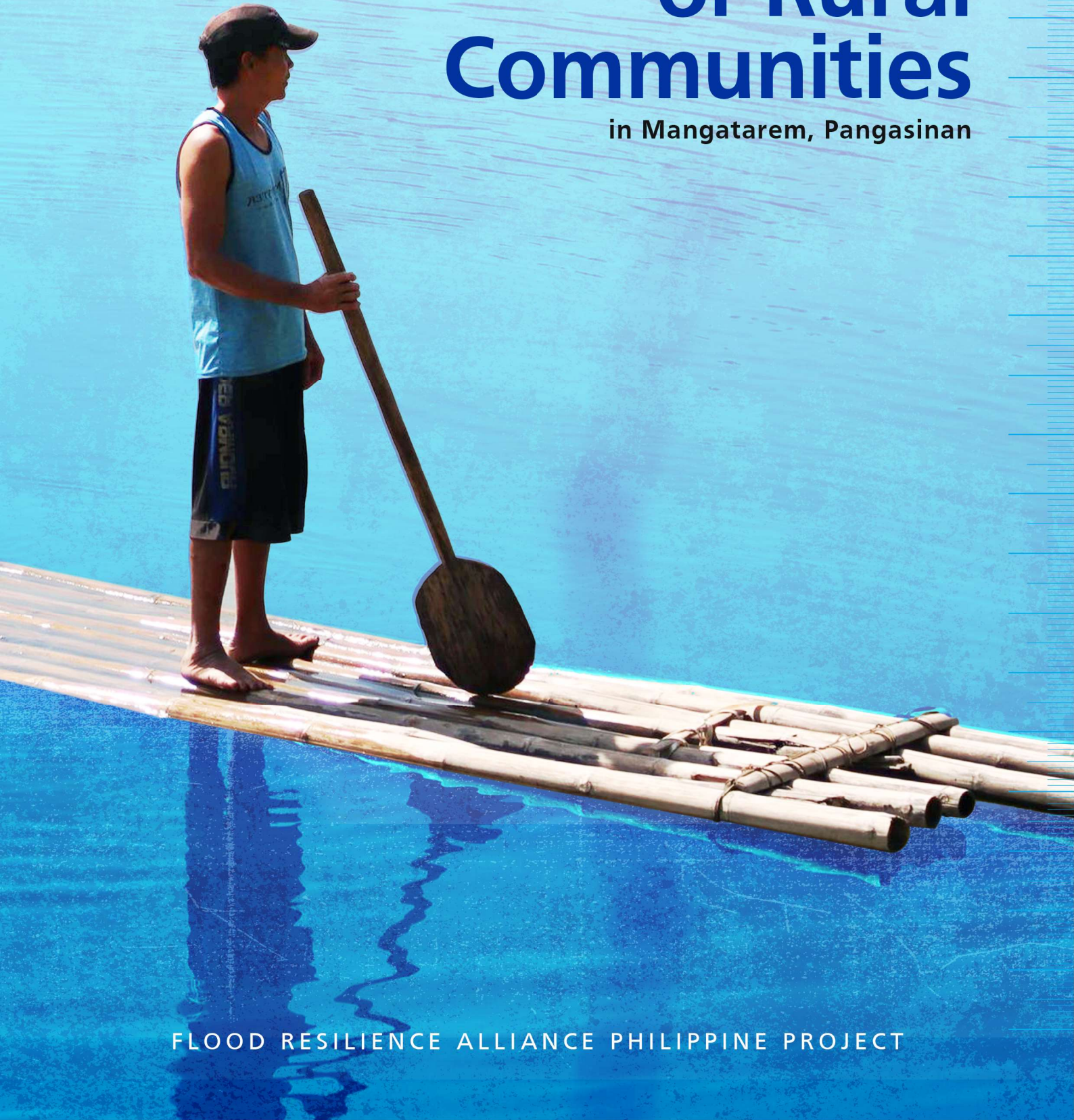




# UNDERSTANDING THE Flood Resilience of Rural Communities

in Mangatarem, Pangasinan



# TABLE OF CONTENTS

Who We Are .....	1
FRA in the Philippines .....	2
What We Do .....	5
Where We Work .....	6
The Floor Resilience Measurement for Communities (FRMC) .....	7
FRMC Process .....	10
FRMC Tool .....	11
FRMC Baseline Study Result in Mangatarem, Pangasinan .....	13
- Bogtong Silag .....	15
- Dorongan Ketaket .....	17
- Dorongan Punta .....	19
- Dorongan Sawat .....	21
- Dorongan Valerio .....	23
- Pampano .....	25

# WHO ARE WE

The **Zurich Flood Resilience Alliance (ZFRA)** is a multi-sectoral partnership focusing on finding practical ways to help communities in developed and developing countries strengthen their resilience to flood risk.

Accurate in January 2021



IMPLEMENT A FULL FLOOD RESILIENCE PROGRAMME

HAVE CARRIED OUT A POST EVENT REVIEW CAPABILITY TO LEARN FROM A DISTASTER

HAVE A LIMITED PROGRAMME TO IMPROVE FLOOD RESILIENCE POLICY

Albania  
 Bangladesh  
 Bolivia  
 Canada (Alberta)  
 Costa Rica  
 El Salvador  
 Germany  
 Honduras  
 Indonesia  
 Jordan  
 Kenya  
 Malawi  
 Mexico  
 Mozambique

Montenegro  
 Nicaragua  
 New Zealand  
 Nepal  
 Peru  
 Philippines  
 Senegal  
 South Sudan  
 Tasmania  
 United Kingdom  
 USA (North & South Carolina, Texas, California, Colorado)  
 Vietnam  
 Zimbabwe

# FRA IN THE PHILIPPINES



**Philippine Red Cross** is the country's premier humanitarian organization and is duly recognized by Philippine law as a voluntary, independent, and autonomous non-governmental organizational auxiliary to the government. The core mandate of PRC is uplifting dignity and alleviating human suffering through the promotion and implementation of its services in times of peace, emergencies, and armed conflict, improving the health, safety, and welfare of the most vulnerable populations.

PRC has significant experience in disaster risk reduction and management (DRRM) all over the country and is recognized as the partner of choice on preparedness, response, and recovery in the Philippines. It is one of the most experienced organizations in the Philippines focusing on community-based work, with more than 200,000 active volunteers across the country.



**The International Federation of Red Cross and Red Crescent Societies (IFRC)** and the PRC have enjoyed a strong partnership over the years, particularly on DRRM programmes. Together with the PRC, IFRC is working with provincial and local leaders, and other key stakeholders to implement the community-based DRRM programme, which will further enhance PRC's capacity in working with communities in terms of DRRM and flood resilience.

The Philippines is the twelfth most populated country in the world and is ranked third globally in terms of its vulnerability to natural hazards. The Philippines is especially prone to hydrometeorological events; floods have accounted for over 80% of natural hazard events in the country during the last half-century and have devastating economic and social impacts.

Data from the Emergency Events Database reveal that floods cause losses that lower average annual gross domestic product (GDP) by 0.8 per cent. In 2009 alone, floods cost approximately USD 4.4 billion: that is 2.7 per cent of the country's GDP. Investments for addressing climate change and disaster risk, including replacing and expanding resilient infrastructure, have so far been wholly inadequate.


Along with climate change-related risk, the Philippines also faces rapid urbanization, socio-economic inequality, and health issues. The Philippines Red Cross (PRC) supports the most vulnerable people affected by events triggered by natural and human-induced hazards. PRC responses aim not only to alleviate suffering during emergencies but also **to build community resilience and local capacities to prepare for and respond to disasters and uplift dignity among the most vulnerable.**




  
**NK6410**  
AGRI BY  
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# WHAT WE DO

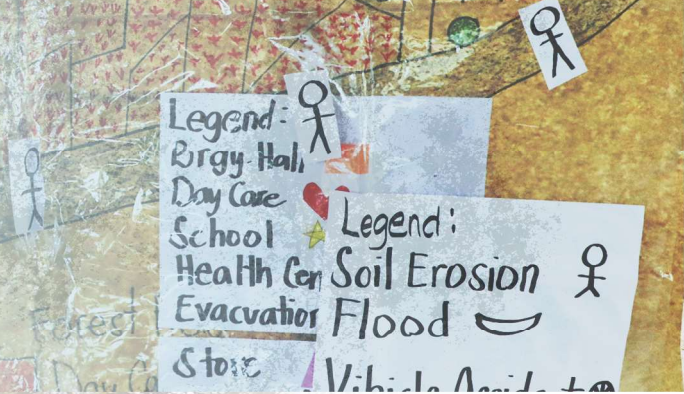
The Flood Resilience Alliance Philippine Project is being incorporated into a wider PRC community and school-based disaster risk reduction programme with the following objectives, along with cross-cutting issues such as climate change adaptation:




Increased community awareness of hazard and risk exposure through participatory tools.



Improved capacity among community and Red Cross volunteers to implement disaster preparedness activities that enable effective response in times of emergency.

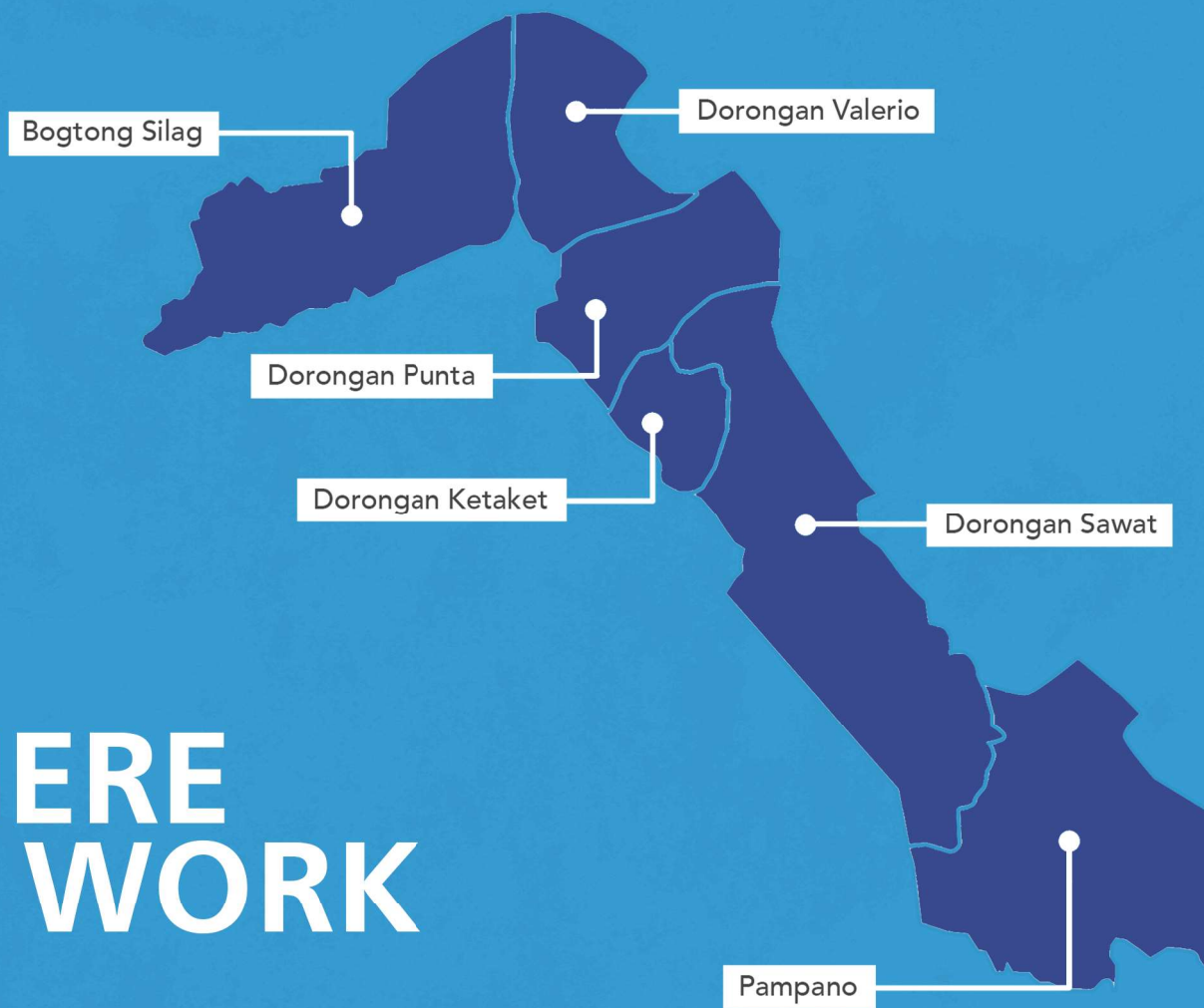


Reduction of identified disaster risks after implementation of recommended mitigation measures.



Improved capacity of PRC in implementing community resilience programmes.

# WHERE WE WORK



Many resilience-building actions can be taken at community level as communities often know best how and where they need to build resilience. Working with communities, we can demonstrate tangible impact on people's lives and learn from best practices which can help to shape policy at a higher level.

PRC is working in six communities in the municipality of Mangatarem, province of Pangasinan. These six communities are located along the Agno River and its tributaries, which are prone to riverine flooding at times of excessive rainfall and strong typhoons.

Pangasinan is the third largest province in the Philippines, with a population of 3 million. The province is at high risk of typhoons, heavy rainfall, floods, and landslides, while lacking vital capacity to cope with and respond to natural hazard events.



# THE FLOOD RESILIENCE MEASUREMENT FOR COMMUNITIES (FRMC)

Using FRMC we look at how communities can reduce flood risks, prepare for floods, respond to floods when they do occur, recover from floods, and avoid the build-up of more flood risk in the future. By working closely with the community, flood risks will become better understood and better incorporated into wider development plans and decisions.

To do this, FRMC uses 44 indicators called 'sources of resilience' to understand a community's location-specific flood risks: hazard, exposure, and vulnerability. Every source of resilience is broken down into a number of different questions that look at different factors that may be relevant for that source. After all the information has been collected, each source of resilience is given a score. In this way the process helps the community understand its strengths and weaknesses before a flood strikes and can be used to identify actions that can increase flood resilience.

## THE FIVE CAPITALS (5Cs)



### HUMAN

education, skills, health



### SOCIAL

Social relationships and networks, bonds that promote cooperation, links facilitating exchange of and access to ideas and resources



### NATURAL

Natural resource base, including land productivity and actions to sustain it, as well as water and other resources that sustain livelihoods



### FINANCIAL

Level, variability and diversity of income sources and access to other financial resources that contribute to wealth



### PHYSICAL

Things produced by economic activity from other capital, such as infrastructure, equipment, improvements in crops, livestock.

## THE FOUR PROPERTIES OF A RESILIENT SYSTEM (4RS)



### ROBUSTNESS

ability to withstand a shock - for example, housing and bridges built to withstand a flood.



### REDUNDANCY

functional diversity - for example having many evacuation routes.



### RESOURCEFULNESS

ability to mobilize when threatened - for example a group within a community that can quickly mobilize to convert a community center into a flood shelter.

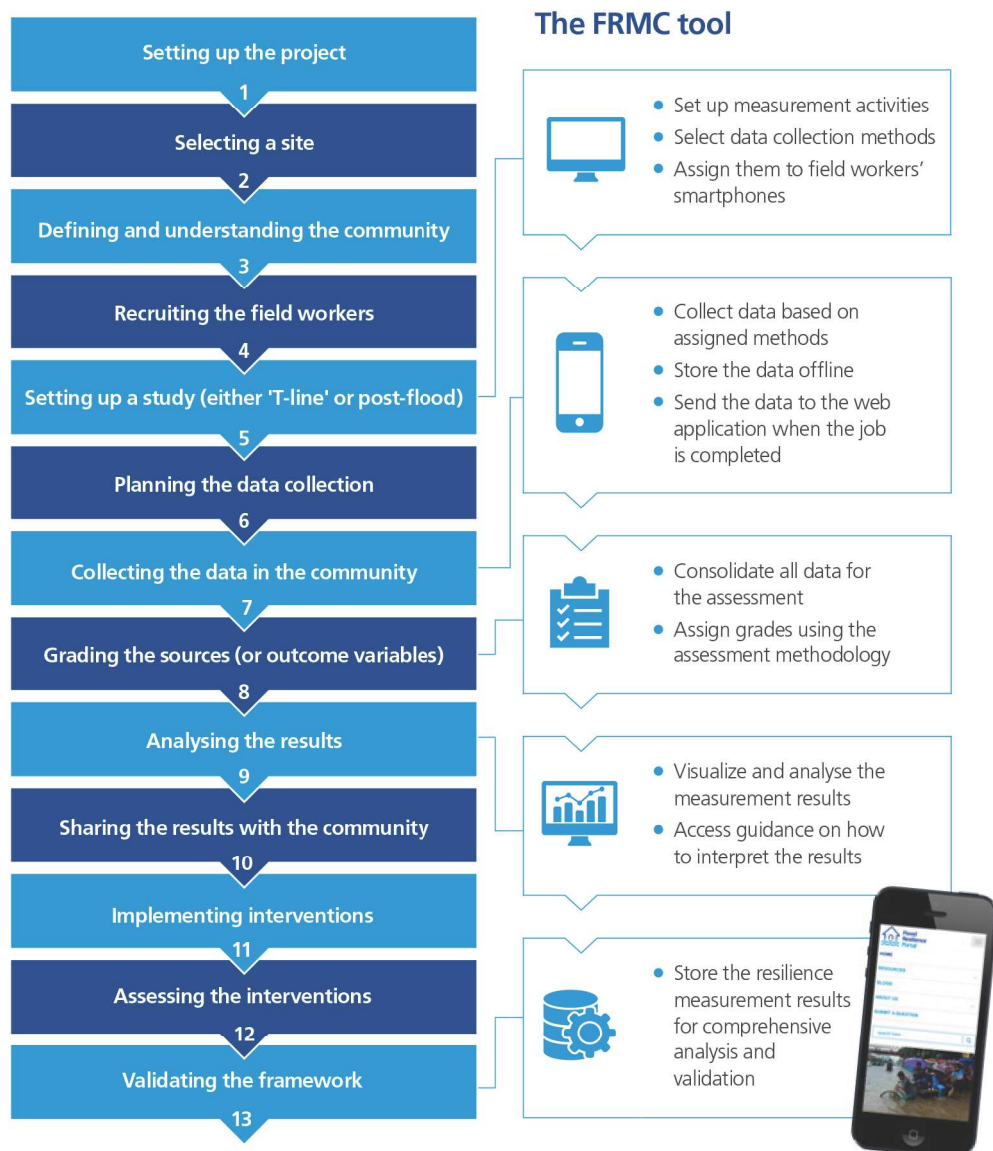


### RAPIDITY

ability to contain losses and recover in a timely manner - for example quick access to sources of financing to support recovery.

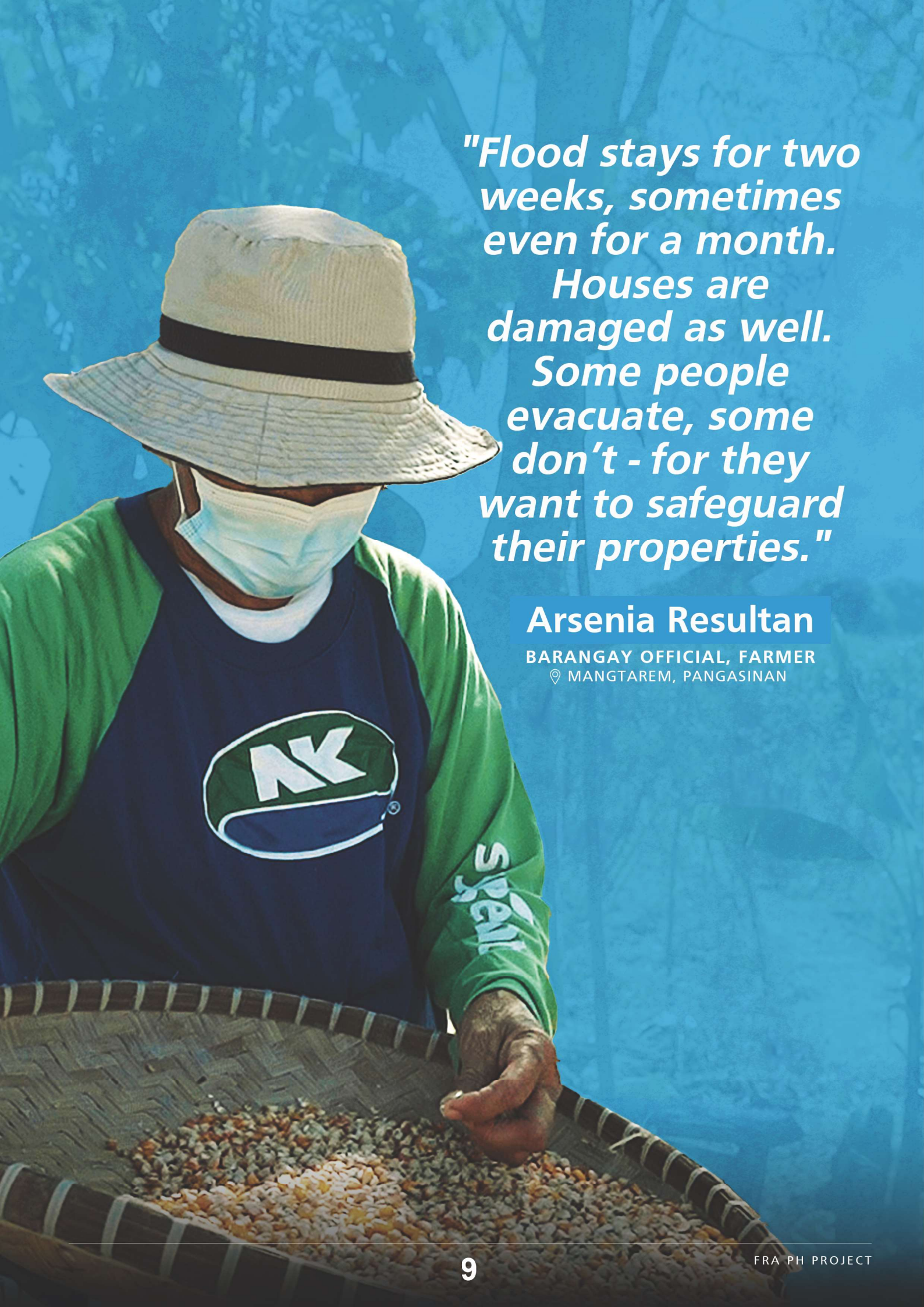
The FRMC process is often part of a wider community disaster risk reduction program and does not stand alone. Certain parts of the process such as project setup and community engagement are meant in the wider sense of the community project, and not just about implementing the measurement using the tool.

The FRMC framework comprises two parts: (1) the Alliance’s framework for measuring community flood resilience; and (2) an associated tool for implementing the framework in practice, or the FRMC Tool.



**The FRMC has several uses that includes:**

- As the first measurement of resilience to be applied on a large scale; fully integrated into community programming.
- To support impact measurement
- To help analyze problems before seeking solutions.
- To generate data for empirical evidence on flood resilience



*"Flood stays for two weeks, sometimes even for a month. Houses are damaged as well. Some people evacuate, some don't - for they want to safeguard their properties."*

**Arsenia Resultan**

BARANGAY OFFICIAL, FARMER  
📍 MANGTAREM, PANGASINAN

# FRMC PROCESS

The FRMC process is often part of a wider community disaster risk reduction programme and does not stand alone. Certain parts of the process such as project setup and community engagement are meant in the wider sense of the community project, and not just about implementing the measurement using the tool.

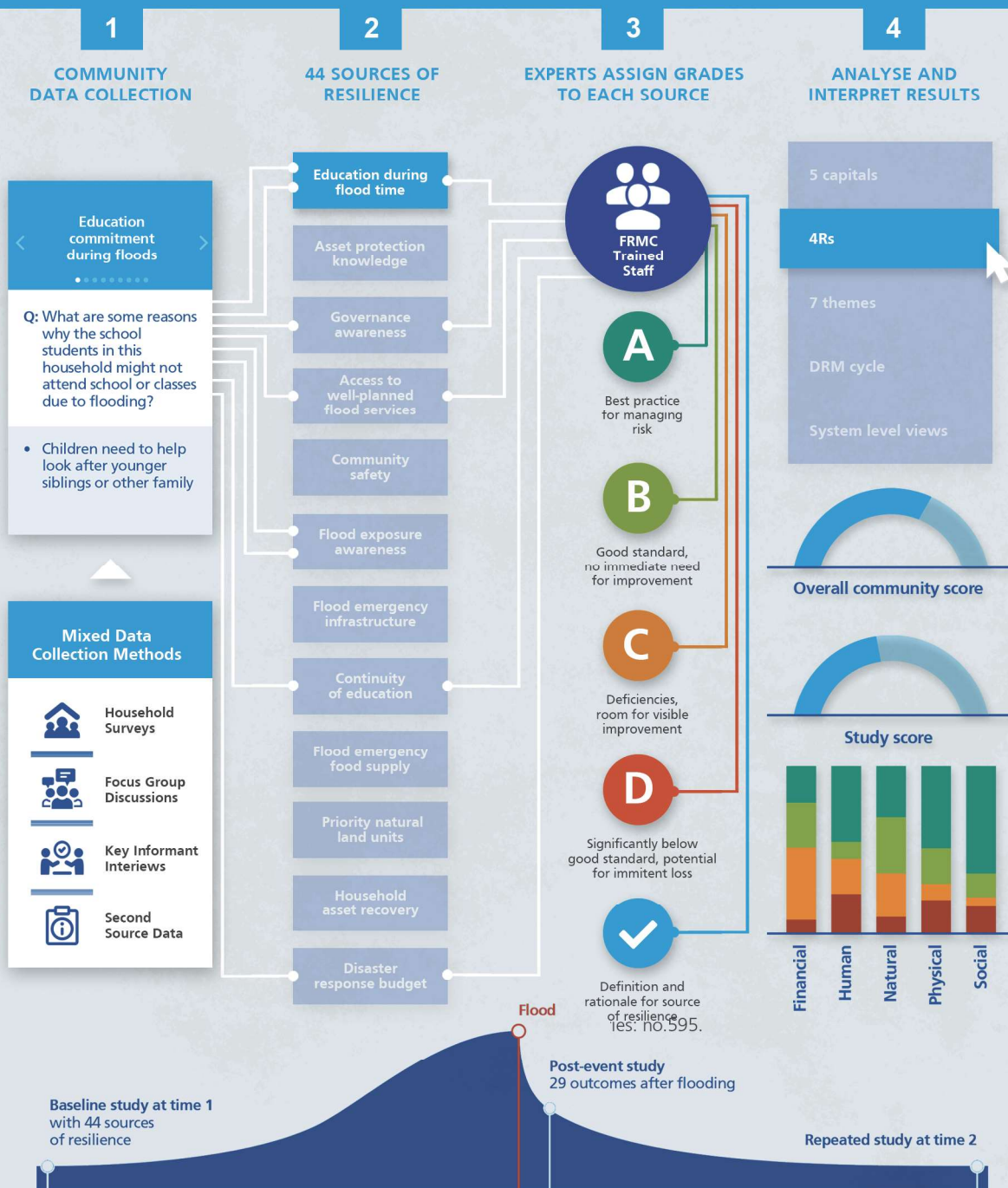


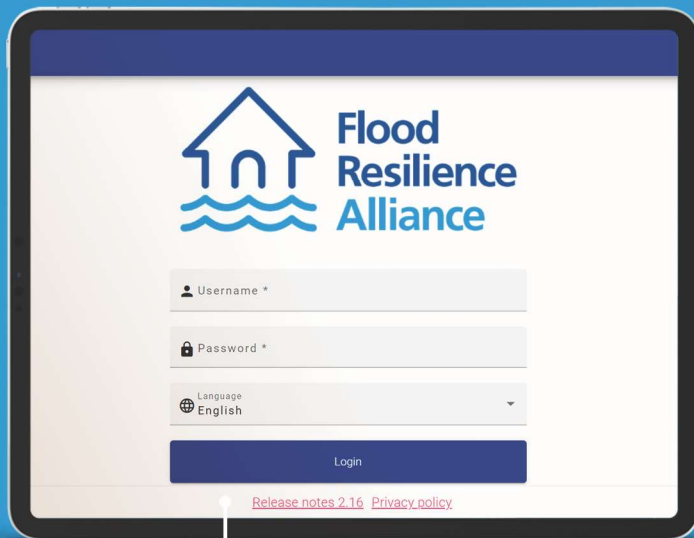
Figure 2 Schematic of the Flood Resilience Measurement for Communities (FRMC) process. Adapted from Laurien and Keating, 2019<sup>3</sup>

3 Laurien, F. & Keating, A. (2019). Evidence from Measuring Community Flood Resilience in Asia. ADB Economics Working Paper Series: no.595. <https://floodresilience.net/resources/item/evidence-from-measuring-community-flood-resilience-in-asia>

The second component of the FRMC – the tool – is a practical hybrid software application comprising an online web-based platform for setting up and analyzing the process and a smartphone- or tablet-based app that can be used offline in the field for data collection.

# FRMC TOOL

MOBILE-BASED APPLICATION  
[AVAILABLE OFFLINE]



ONLINE WEB-BASED PLATFORM



## HOW WE MEASURE THE SOURCES OF RESILIENCE

- A** Best practice for managing the risk.
- B** Good industry standard, no immediate need for improvement.
- C** Deficiencies, room for visible improvement.
- D** Significantly below good standard, potential.

To measure each source of resilience in a given community, data can be collected in four different ways (i.e. household surveys, key informant interviews, focus group discussions, and the use of secondary sources) according to context and need.

After data is collected on the app, it is uploaded to the web application. Assessors grade each of the 44 sources of resilience on an A–D scale (A being best practice, D being poor). Trained assessors compare source definitions with the collected data, drawing on their experience, training, the user manual and related guidance.

The 44 grades between A and D awarded to each community are then aggregated in different ways for analysis. Aggregations, or “lenses”, by which resilience can be viewed include the 5Cs and the 4Rs. Further lenses are the seven themes by which questions are sequenced thematically (such as healthcare, education, livelihoods etc.), the five steps of the Disaster Risk Management (DRM) cycle (preparedness, response, recovery, prospective risk reduction, and corrective risk reduction), and context (either community-level or enabling environment).

## 44 SOURCES OF RESILIENCE

Asset protection knowledge	Business Continuity	Communication Interruption	Community Disaster Fund
Community Disaster Risk Management Planning	Community Participation in Flood Related Activities	Community Representative Bodies	Community Safety
Community Structures for Mutual Assistance	Conservation Budget	Disaster Response Budget	Early Warning Systems (EWS)
Education Commitment during Floods	Environmental Management Awareness	Evacuation and Safety Knowledge	External Flood Response and Recovery Services
First Aid Knowledge	Flood Emergency Food Supply	Flood Emergency Infrastructure	Flood Energy Supply
Flood Exposure Awareness	Flood Healthcare Access	Flood Safe Water	Flood Waste Contamination
Future Flood Risk Awareness	Governance Awareness	Household Asset Recovery	Household Flood Protection
Household Income Continuity Strategy	Integrated Flood Management Planning	Inter-community Flood Coordination	Large Scale Flood Protection
Local Leadership	National Forecasting Policy & Plan	Natural Capital Condition	Natural Habitat Restoration
Natural Resource Conservation	Priority Managed Units	Priority Natural Units	Provision of Education
Risk Reduction Investments	Social Inclusiveness	Transportation Interruption	Water and Sanitation Awareness

# FRMC BASELINE STUDY RESULTS

## in Mangatarem, Pangasinan

PRC is working with four communities (Bogtong Silag, Dorongan Valerio, Dorongan Sawat, and Pampano) in the municipality of Mangatarem, in Pangasinan province. These four communities are located along the Agno River and its tributaries, which are prone to riverine flooding at times of excessive rainfall and strong typhoons.

The study was conducted in the communities of barangay Bogtong Silag, Dorongan Sawat, Dorongan Valerio, and Pampano including a total of 5 schools within the municipality of Mangatarem in the province Pangasinan. The communities have a total population of 8,650 with Pampano being the most populated barangay (2,642 people) and Bogtong Silag with the least people (1,599).



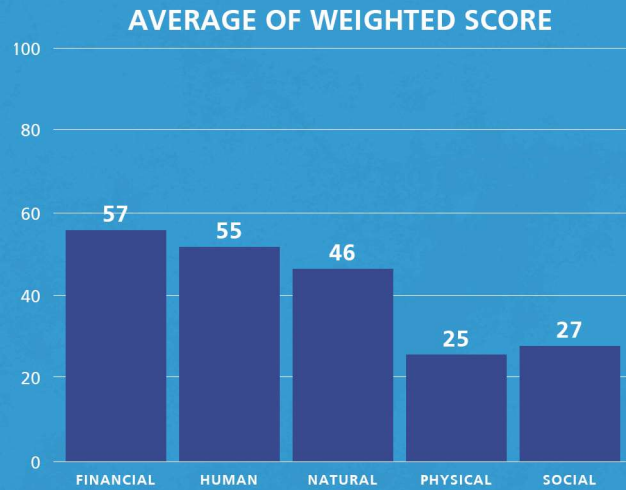
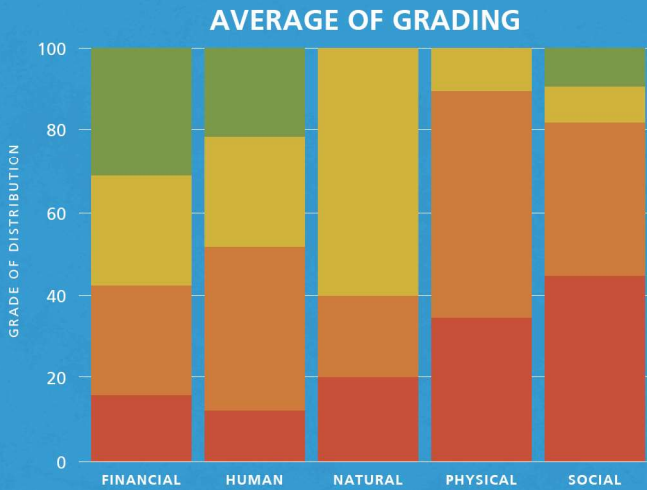




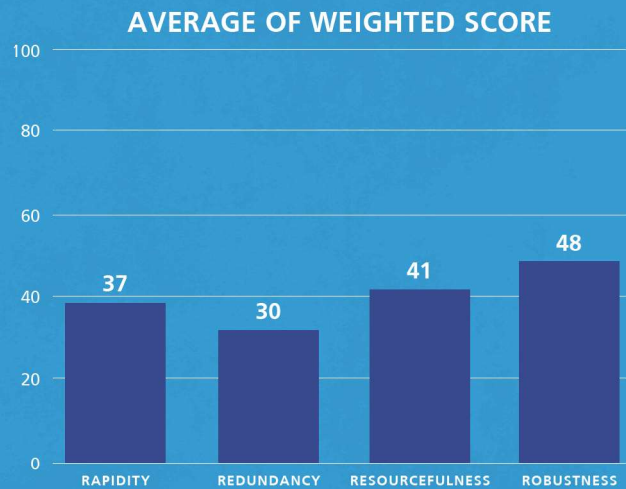
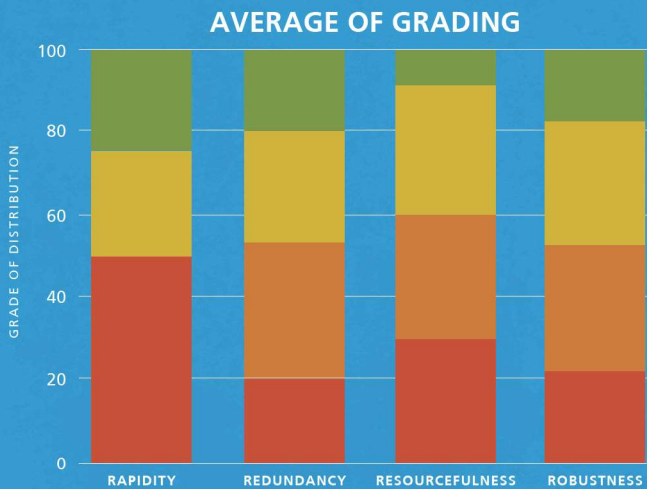
# BOGTONG SILAG

TO (BOGTONG SILAG) ●

## CAPITAL (5Cs)

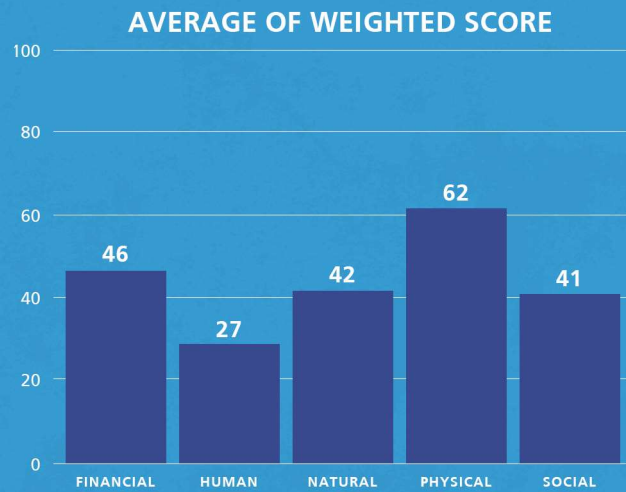
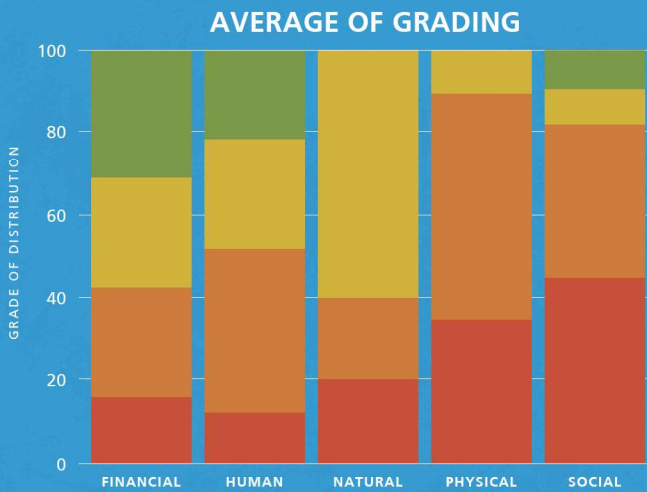


## PROPERTIES OF RESILIENCE (4Rs)

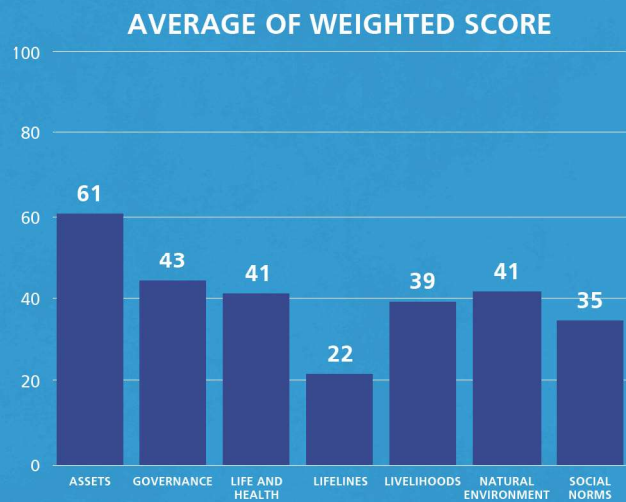
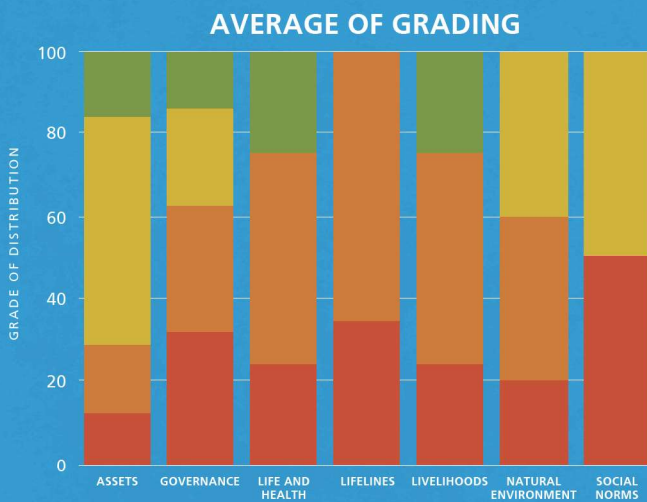


	HIGHS	LOWS		
LENS	<ul style="list-style-type: none"> <li>Financial Capital</li> <li>Robustness</li> <li>Recovery</li> <li>Assets</li> </ul>	<ul style="list-style-type: none"> <li>Physical Capital</li> <li>Redundancy</li> <li>Preparedness</li> <li>Lifelines</li> </ul>		
SOURCES	<ul style="list-style-type: none"> <li>Water &amp; sanitation awareness</li> <li>Environmental management awareness</li> <li>Community safety</li> <li>Community structures for mutual assistance</li> <li>Community representative body</li> </ul>	<ul style="list-style-type: none"> <li>Early warning system</li> <li>Flood emergency infrastructure</li> <li>Provision of education</li> <li>Transportation interruption</li> <li>Communication interruption</li> <li>Flood waste contamination</li> <li>Business continuity</li> <li>Household income continuity strategy</li> <li>Conservation budget</li> </ul>		
	<b>D GRADE</b>	<b>C GRADE</b>	<b>B GRADE</b>	<b>A GRADE</b>

## DRM CYCLE



## THEMES



Bogtong Silag has a strong disaster response mechanism reinforced by previous experiences from major flooding events in the past. The barangay council has invested resources on rescue equipment and early warning devices coupled with personnel who go around the community to alert people of the impending flood. However, the barangay council and other informal leaders of the community need to develop a mechanism in which planning and decision making is more inclusive and participatory. The study also showed the need to invest more on disaster preparedness and a more flood-specific risk management planning.

**D GRADE**

**C GRADE**

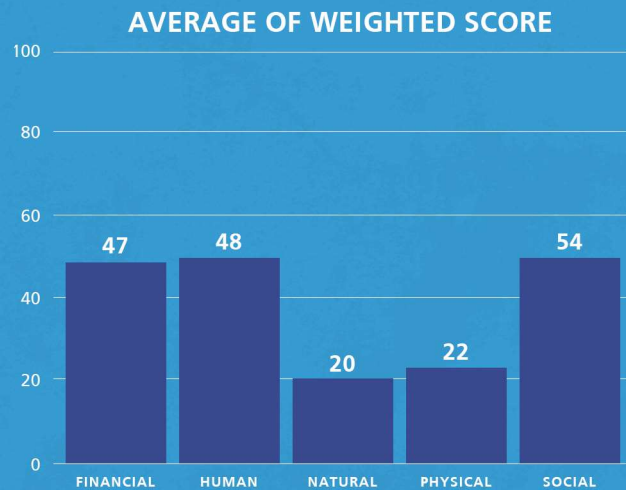
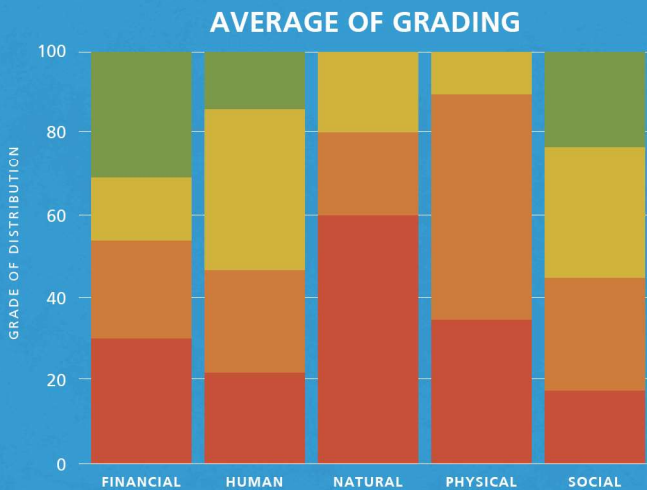
**B GRADE**

**A GRADE**

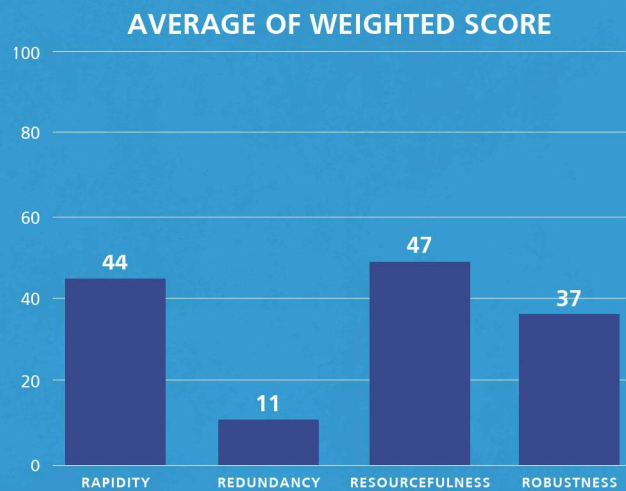
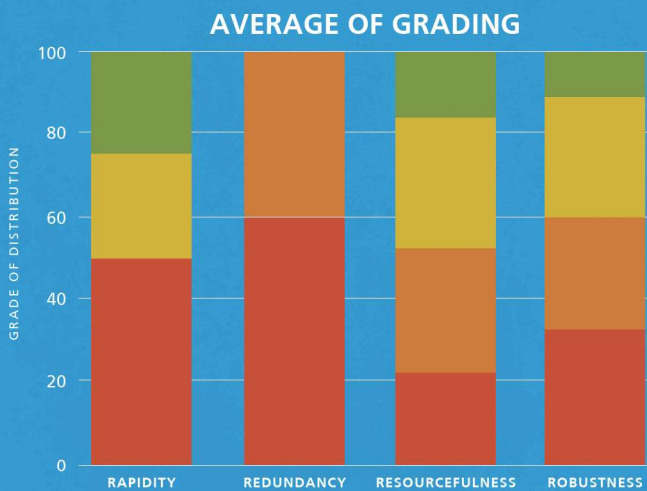
# DORONGAN KETAKET

TO (DORONGAN KETAKET) ●

## CAPITAL (5Cs)

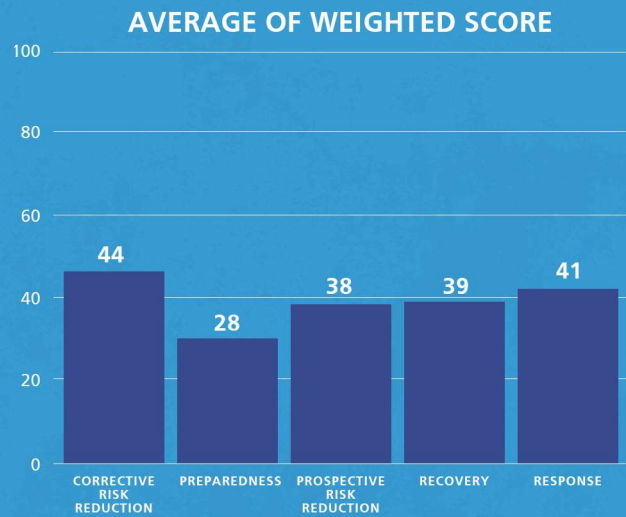
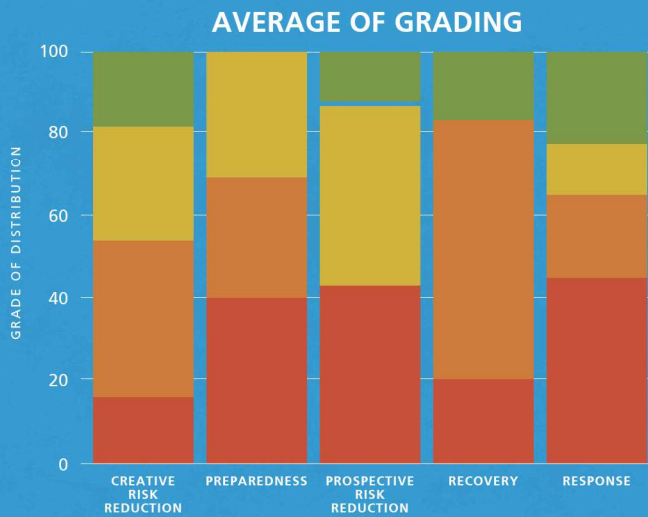


## PROPERTIES OF RESILIENCE (4Rs)

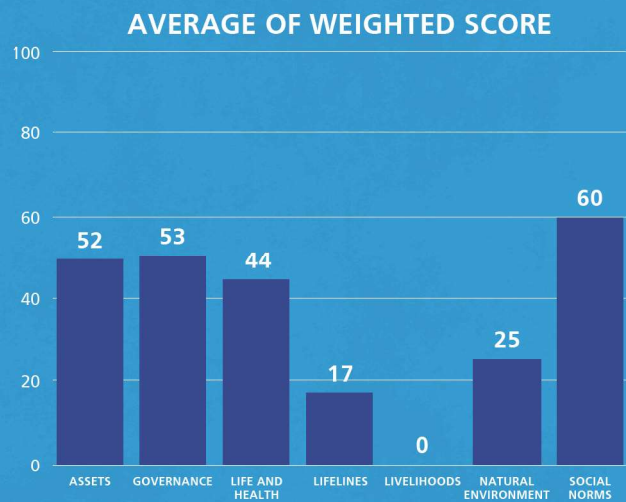
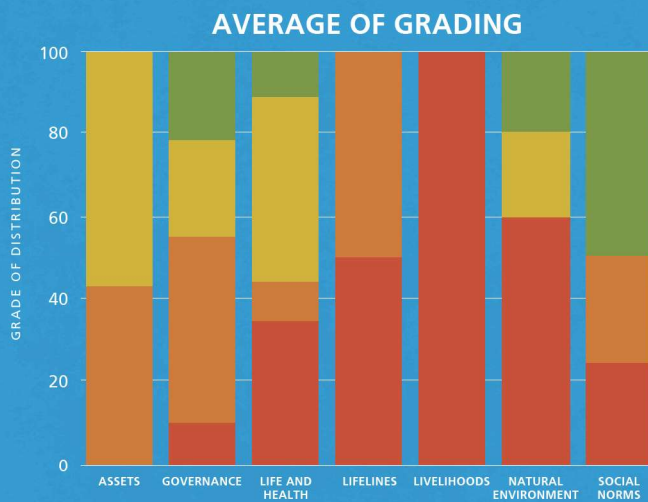


	HIGHS	LOWS		
LENS	<ul style="list-style-type: none"> <li>Social Capital</li> <li>Resourcefulness</li> <li>Corrective Risk Reduction</li> <li>Social Norms</li> </ul>	<ul style="list-style-type: none"> <li>Natural &amp; Physical Capitals</li> <li>Redundancy</li> <li>Preparedness</li> <li>Livelihoods</li> </ul>		
SOURCES	<ul style="list-style-type: none"> <li>Community safety</li> <li>Community structures for mutual assistance</li> <li>Community representative bodies</li> <li>Governance awareness</li> </ul>	<ul style="list-style-type: none"> <li>Education commitment during floods</li> <li>Early warning system</li> <li>Transportation interruption</li> <li>Flood emergency infrastructure</li> <li>Business continuity</li> <li>Natural capital condition</li> <li>Priority natural units</li> <li>Priority managed units</li> </ul>		
	<b>D GRADE</b>	<b>C GRADE</b>	<b>B GRADE</b>	<b>A GRADE</b>

## DRM CYCLE



## THEMES



The community members of Dorongan Ketaket are socially cohesive, evidenced by the presence of community representative bodies and informal structures of mutual assistance during flooding. However, policies and activities for disaster preparedness need strengthening as the community does not have an early warning system nor alternatives to stay connected as power, water, and telecommunication interruptions are common during flooding.

D GRADE

C GRADE

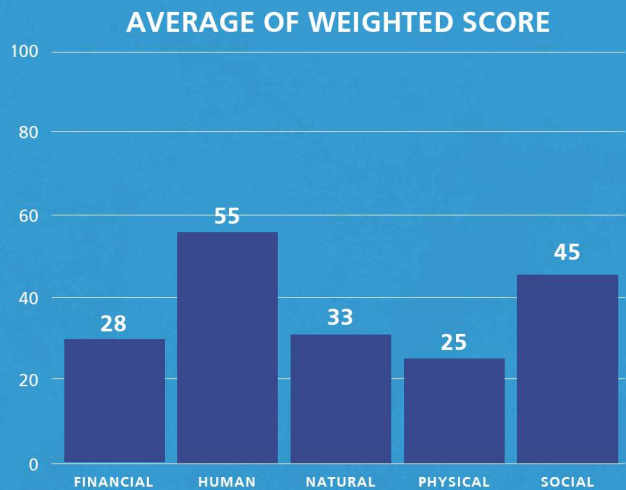
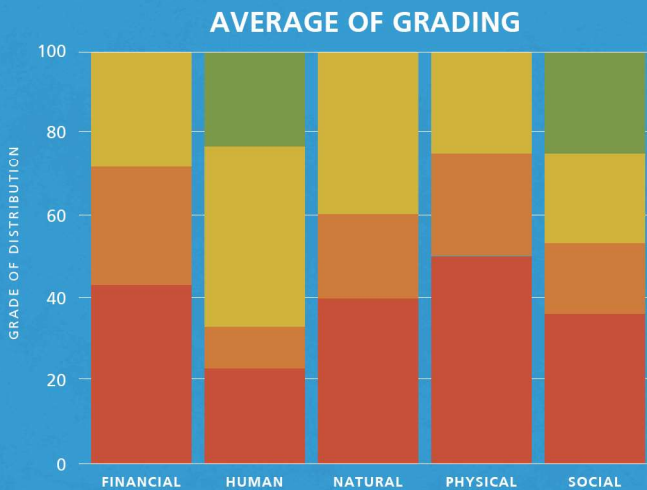
B GRADE

A GRADE

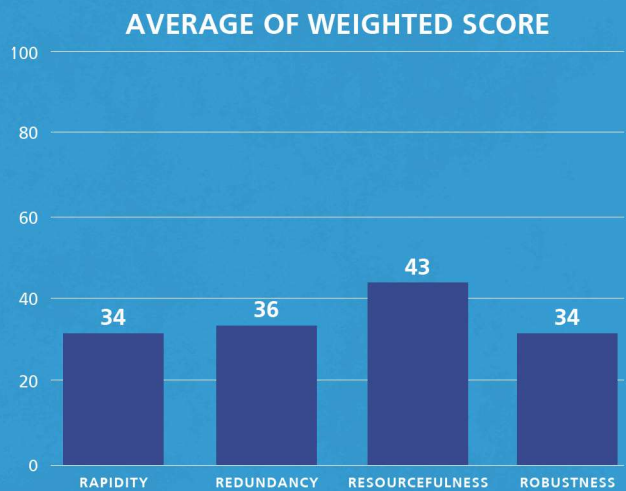
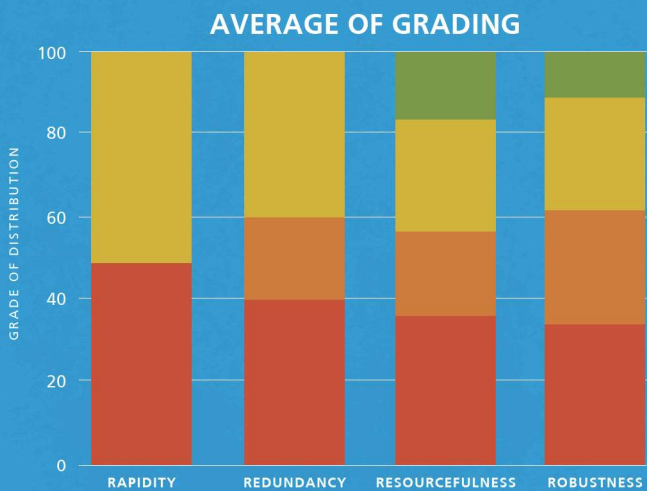
# DORONGAN PUNTA

T0 (DORONGAN PUNTA)

## CAPITAL (5Cs)

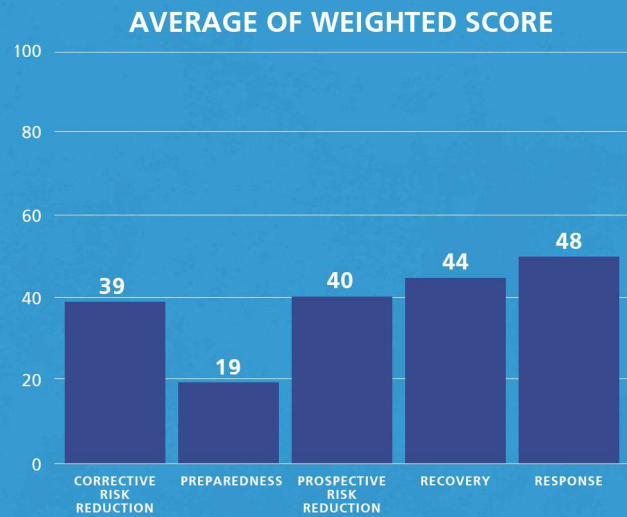
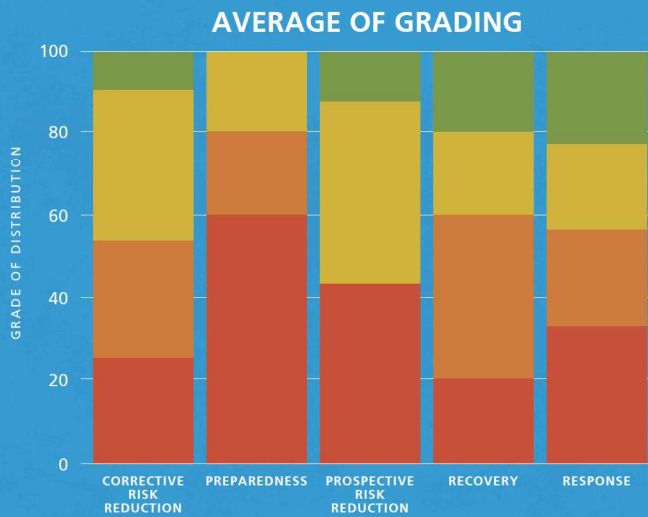


## PROPERTIES OF RESILIENCE (4Rs)

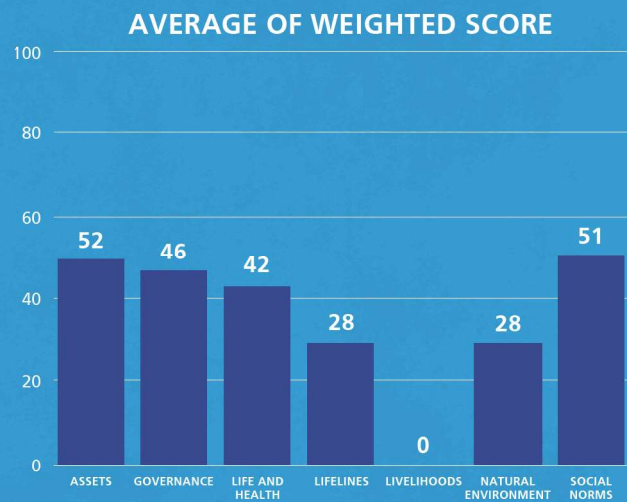
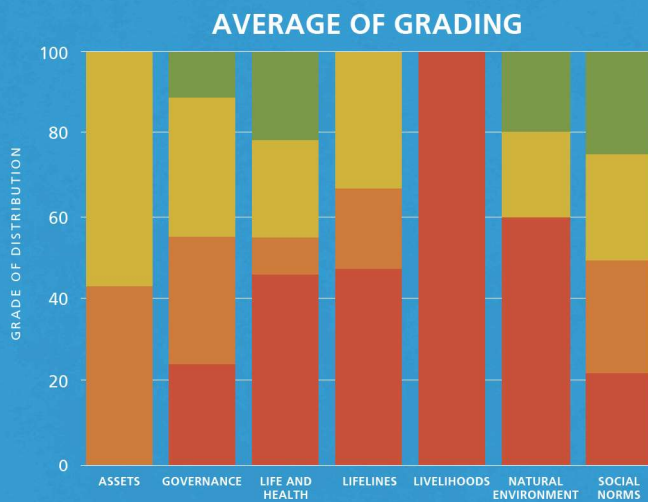


	HIGHS	LOWS
LENS	Human Capital Resourcefulness Response Assets & Social Norms	Physical & Financial Capital Rapidity & Robustness Preparedness Livelihoods
SOURCES	Water & sanitation awareness Environmental management awareness Community safety Community structures for mutual assistance Community representative bodies	Early warning system Flood emergency infrastructure Provision of education Transportation interruption Communication interruption Flood waste contamination Business continuity Household income continuity strategy Conservation budget
	<b>D GRADE</b>	<b>C GRADE</b>
	<b>B GRADE</b>	<b>A GRADE</b>

## DRM CYCLE



## THEMES



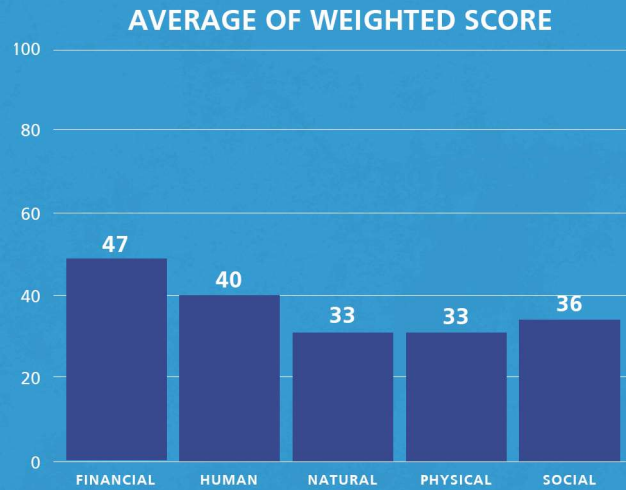
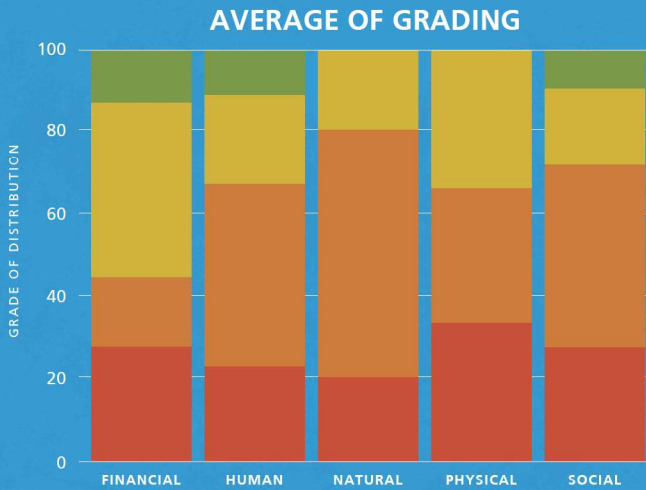
Similar to Dorongan Ketaket, community members of Doronga Punta are socially cohesive, vulnerable groups are represented by local organizations that articulate their interests. The community is also keen on sound water and sanitation practices, however, disaster preparedness activities and programs also needs strengthening as there are no established early warning systems and local response teams that can rapidly respond to the community’s needs during flooding. Transportation and education are also severely affected by flood as both get interrupted for an indefinite period of time.



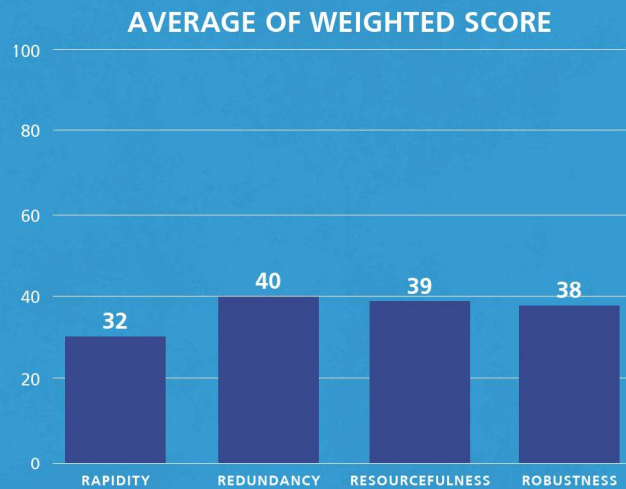
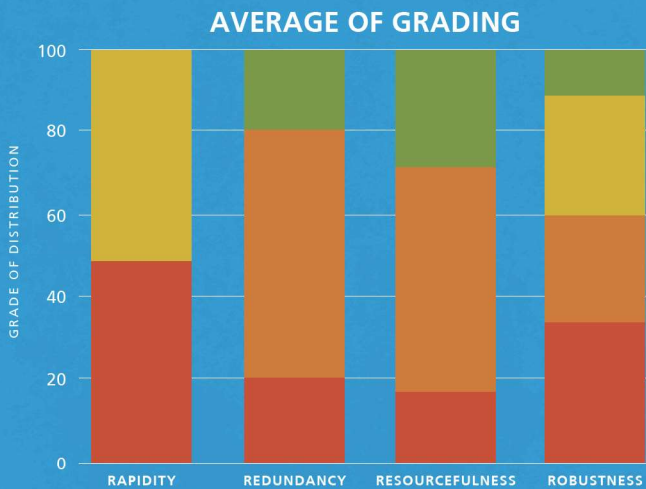
# DORONGAN SAWAT

T0 (DORONGAN SAWAT) ●

## CAPITAL (5Cs)

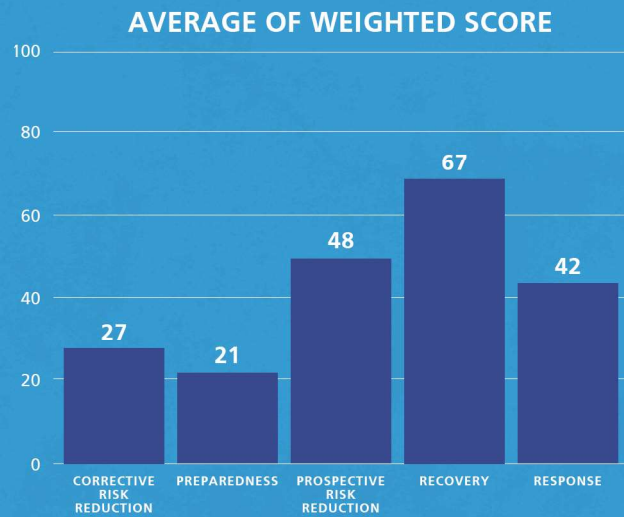
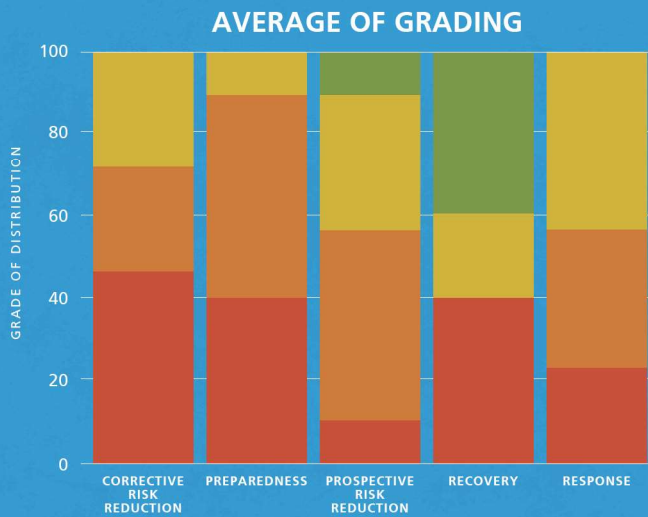


## PROPERTIES OF RESILIENCE (4Rs)

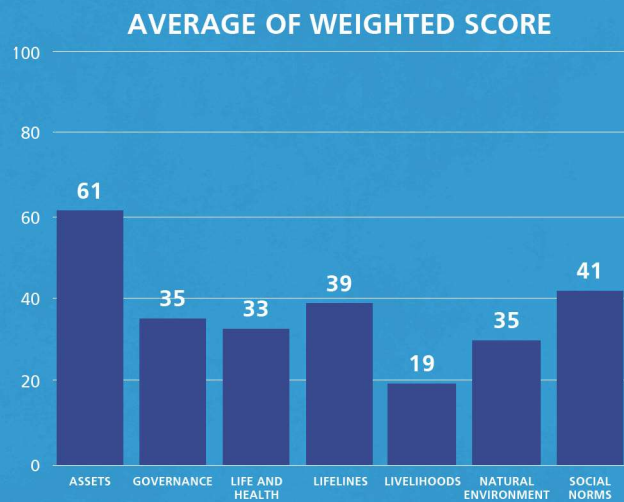
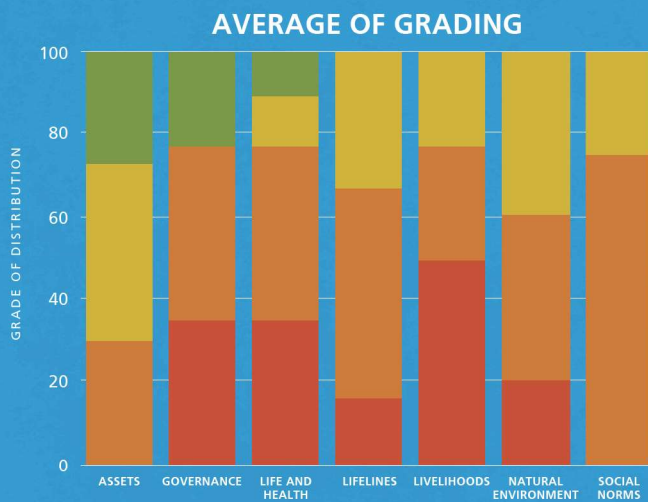


	HIGHS	LOWS
<b>LENS</b>	<ul style="list-style-type: none"> <li>Financial Capital</li> <li>Redundancy &amp; Resourcefulness</li> <li>Recovery</li> <li>Assets</li> </ul>	<ul style="list-style-type: none"> <li>Natural &amp; Physical Capitals</li> <li>Rapidity</li> <li>Preparedness</li> <li>Livelihoods</li> </ul>
<b>SOURCES</b>	<ul style="list-style-type: none"> <li>Household Asset Recovery</li> <li>Future flood risk awareness</li> <li>Community safety</li> </ul>	<ul style="list-style-type: none"> <li>Priority managed units</li> <li>Flood healthcare access</li> <li>Flood emergency infrastructure</li> <li>Large scale flood protection</li> <li>Flood waste contamination</li> <li>Community disaster risk management planning</li> <li>Evacuation and safety knowledge</li> </ul>
	<b>D GRADE</b>	<b>C GRADE</b>
		<b>B GRADE</b>
		<b>A GRADE</b>

## DRM CYCLE



## THEMES



One of the strengths of Dorongan Sawat is its quick recovery from the impact of major flooding events. Throughout the many years of experience with flooding, the community people have already identified various strategies on how to prevent loss and damages. However, due to insufficient infrastructures to prevent the overflow of floodwater from the river, the majority of the community are still affected every year including people's access to healthcare due to the location of the health center.

D GRADE

C GRADE

B GRADE

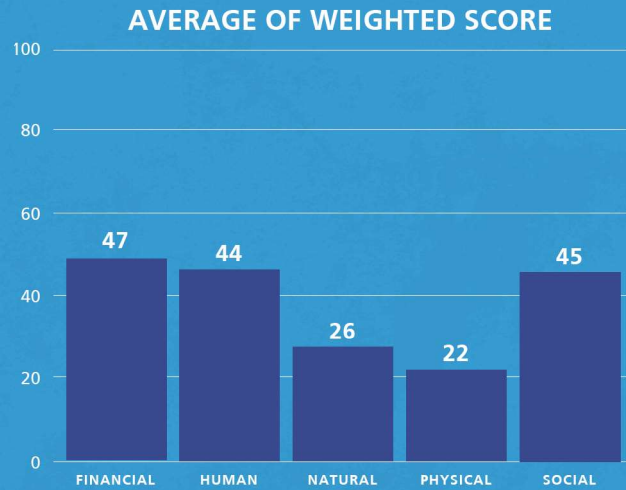
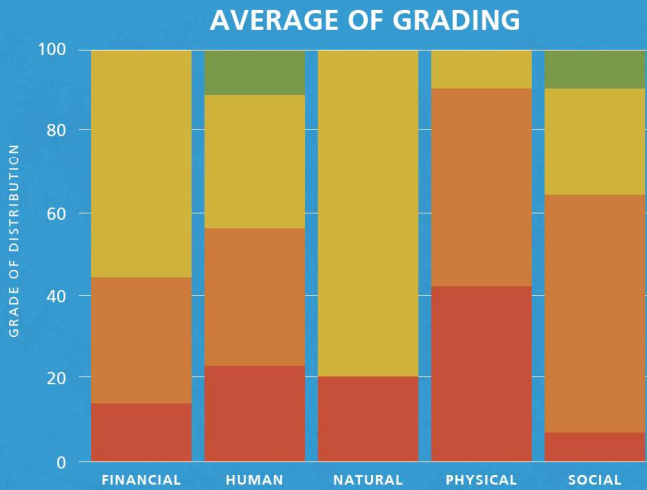
A GRADE



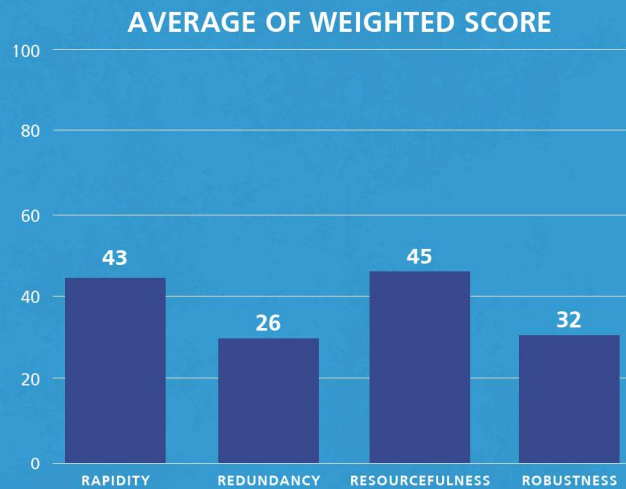
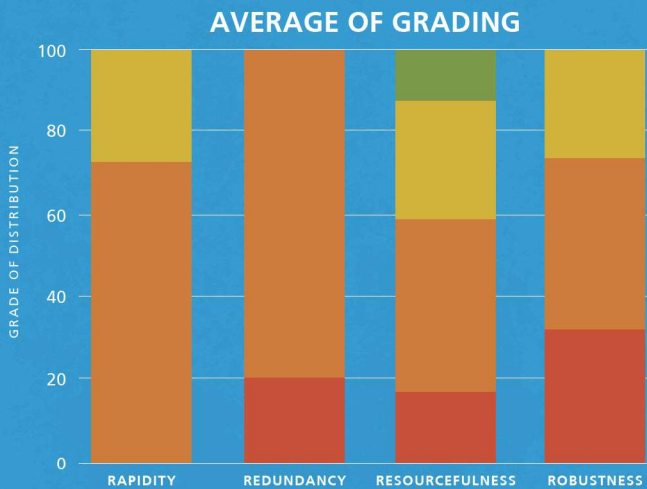
# DORONGAN VALERIO

T0 (DORONGAN VALERIO)

## CAPITAL (5Cs)

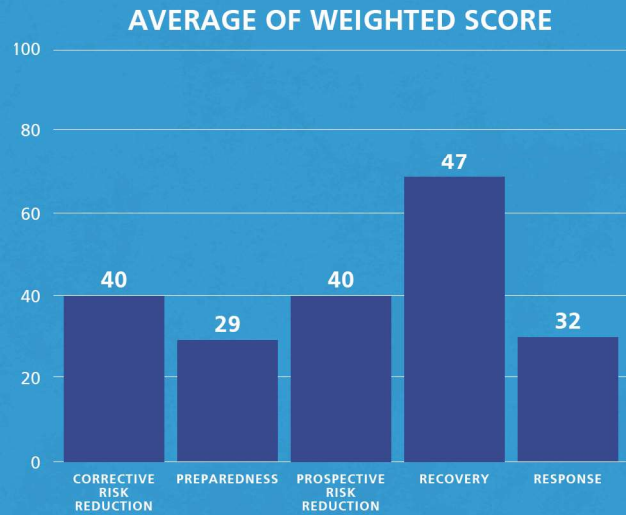
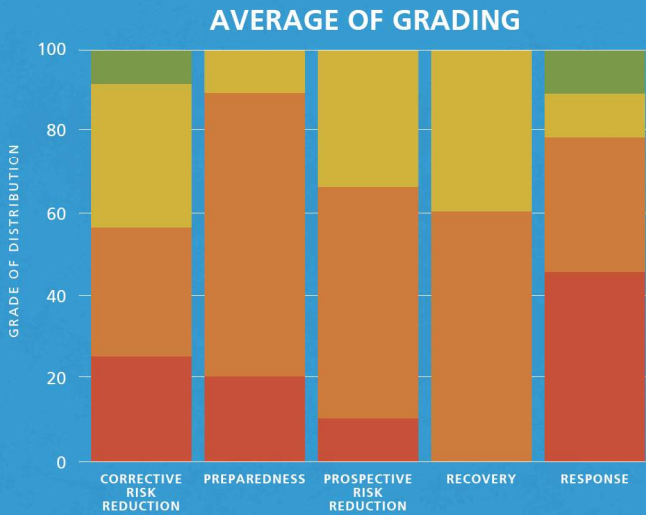


## PROPERTIES OF RESILIENCE (4Rs)

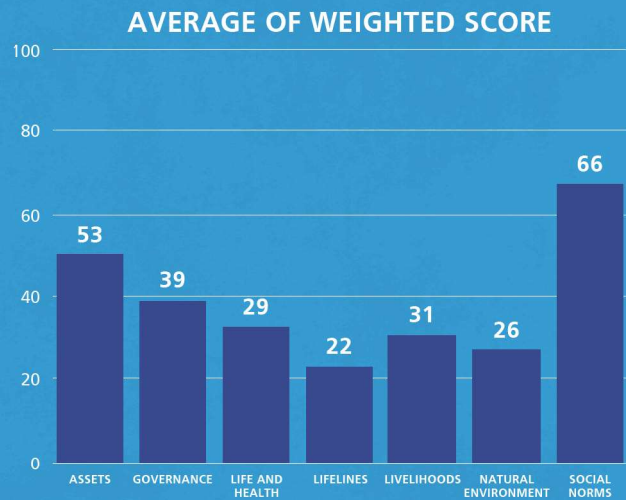
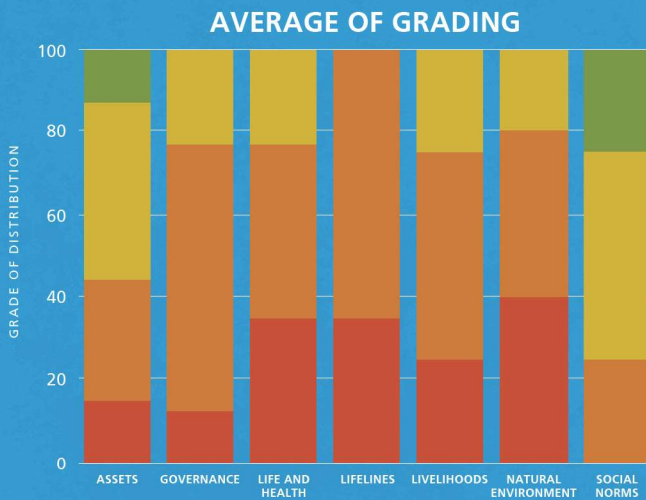


	HIGHS	LOWS
<b>LENS</b>	Financial & Social Capitals Resourcefulness Recovery Social Norms	Physical & Natural Capitals Redundancy Preparedness Lifelines
<b>SOURCES</b>	Flood Exposure Awareness Community structures for mutual assistance	Flood healthcare Access Flood emergency infrastructure Large scale flood protection Flood emergency food supply Flood waste contamination Household income continuity strategy Priority managed units Environmental management awareness
	<b>D GRADE</b>	<b>C GRADE</b>
	<b>B GRADE</b>	<b>A GRADE</b>

## DRM CYCLE



## THEMES



One of the major challenges faced by Dorongan Valerio are damages and losses on their livelihood after a major flooding event. In 2018 throughout the course of the intense monsoon season, their community suffered from five flooding events that left farmers and their families with debt. The FRMC study showed that, although the community has strong financial capitals and can recover quickly from the short-term impacts of flooding, it is necessary to look into how they can prevent flooding from occurring in their community and how to better prepare for it.

D GRADE

C GRADE

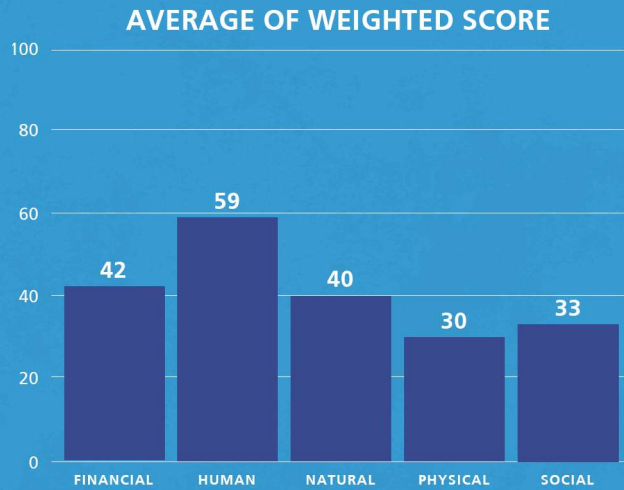
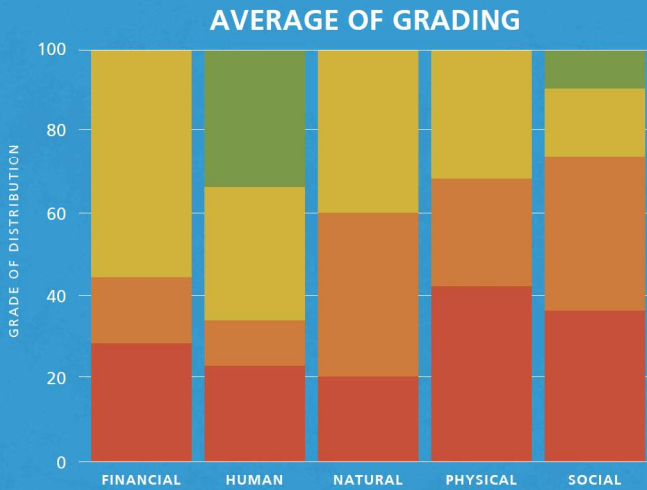
B GRADE

A GRADE

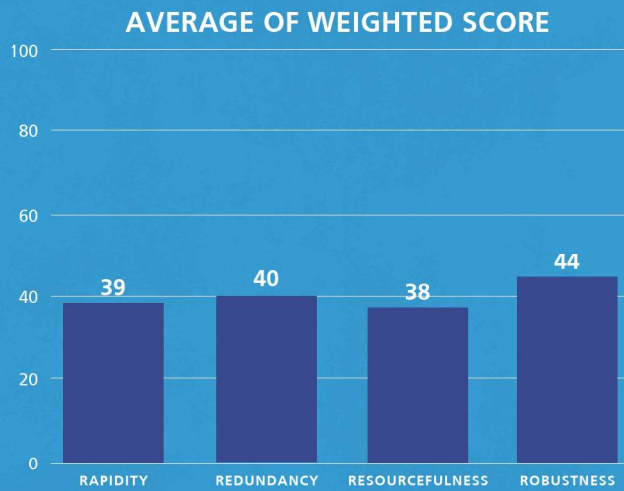
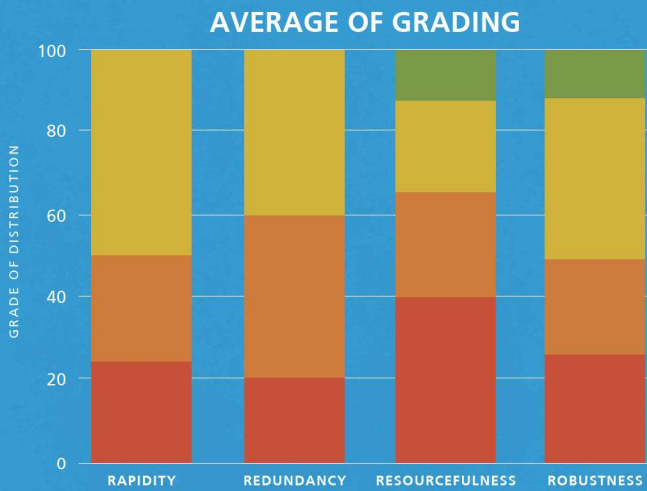
# PAMPANO

TO (PAMPANO) ●

## CAPITAL (5Cs)

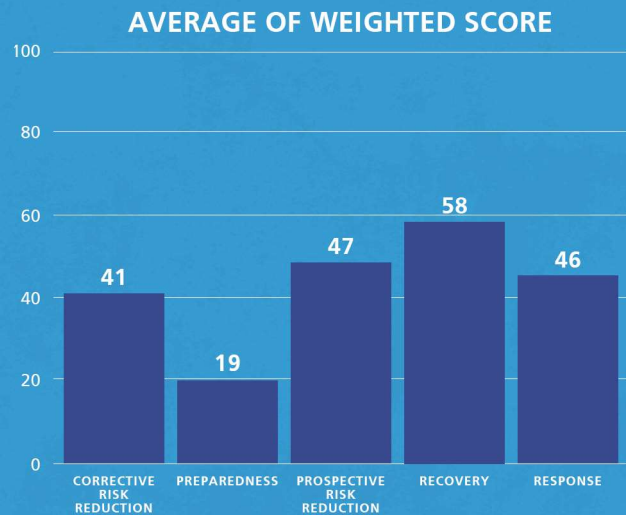
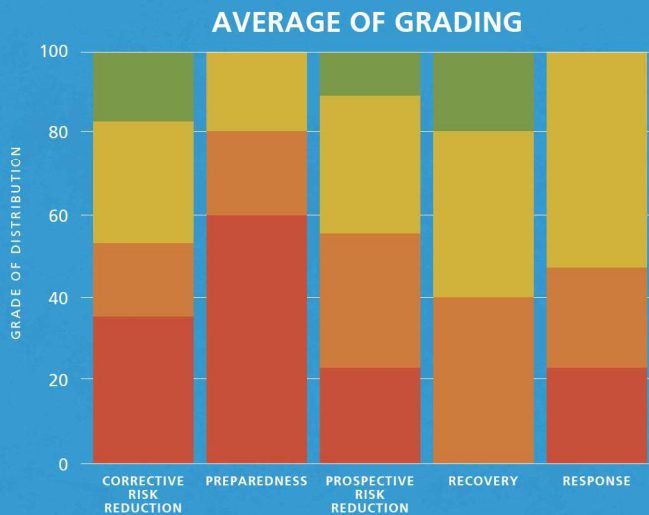


## PROPERTIES OF RESILIENCE (4Rs)

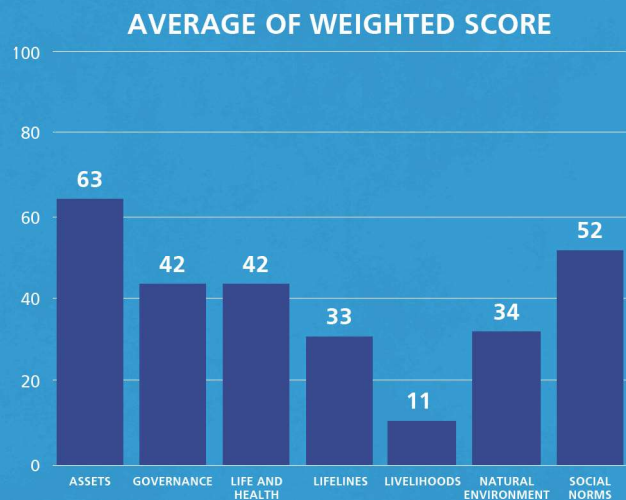
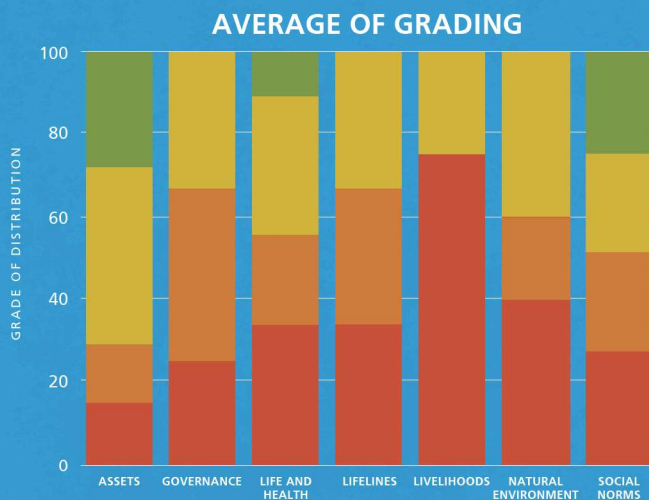


	HIGHS	LOWS
<b>LENS</b>	Human Capital Robustness Recovery Assets	Physical Capital Resourcefulness Preparedness Livelihoods
<b>SOURCES</b>	Flood exposure awareness Future flood risk awareness Community safety	Early warning system Flood emergency infrastructure Large scale flood protection Flood emergency food supply Flood waste contamination Education commitment during floods Environmental management awareness Priority managed units Household income continuity strategy
	<b>D GRADE</b>	<b>C GRADE</b>
	<b>B GRADE</b>	<b>A GRADE</b>

## DRM CYCLE



## THEMES



A number of Pampano’s infrastructures are located along the banks of the river that cuts across their community. These include the barangay hall (community center), elementary school, health center and multi-purpose hall. There are no large-scale flood protection built along the riverbanks that protect these infrastructures as well as houses and farms during the monsoon season. The FRMC study showed that during and after a major flooding event, farms are damaged and household income losses increase. The school also remains closed until flood waters subside resulting in children missing more school days every year.





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