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# **The Interlinkages of Community Resilience and Institutional Vulnerability**

**A Thesis submitted in the Partial Fulfillment for the Requirement of the Degree**

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Aya Altom Babiker Mohammed

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## **Abstract**

Climate change and reaching the planetary boundaries are causing more frequent extreme weather events and yet more frequent disasters, which requires a better understanding and management of disasters from scientists, professionals, politicians, and civil society.

In the literature of Disaster Risk Management DRM; the importance of measuring resilience and vulnerability has been highlighted several times, measuring them is crucial for evaluating risk, better planning, mitigation, and adaptation to disasters.

This research aims to better understand resilience and vulnerability through examining the interlinkages between the attributes of community resilience and institutional vulnerability, in the context of the global south where the most vulnerable countries are located. The two case studies investigated in this research are located in Sudan: 1-Tuti island: an island in the heart of Khartoum that represents a pure and unique environment of community resilience towards floods, 2-Almakaylab village: which represents the typical predominant environment of communities surprised by floods.

The results show that the attributes are highly interlinked by nature, and also in the real situation of a disaster. local communities in the global south have considerable coping and adapting capacities that directly contribute to their resilience, on the other hand, the fragile states and official DRM institutions in that context make their role almost non-existent. Luckily a potential for DRM co-production, DRM decentralization, and community-based DRM is observed, where communities can take an active role in DRM in the future.

**Key Words:** Disaster Risk Management DRM, Community Resilience, Institutional Vulnerability, Coping and Adapting Capacities, Global South, Southern theory, DRM decentralization, Sudan.

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**List of Apprviations**

CEN-SAD	Community of Sahel-Saharan States
CCA	climate change adaptaion
COMESA	Common Market for Eastern and Southern Africa
COR	Commission for Refugees - Sudan
CVHW	Commission of Voluntary and Humanitarian Work - Sudan
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
GTZ	German Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit)
HAC	Humanitarian Aid Commission - Sudan
ICPAC	IGAD Climate Prediction and Application Center
IFRC	International Federation of Red Cross and Red Crescent Societies
IGAD	Intergovernmental Authority on Development
INGOs	International Non-Governmental Organizations
IPCC	Intergovernmental Panel on Climate Change
NAP	National Adaptation Plan
NCCD	The National Council of Civil Defence - Sudan
NGOs	Non-Governmental Organizations
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
RSA	Remote Sensing Authority - Sudan
SMA	Sudanese Metrological Authority
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
UNISDR	UN International Strategy for Disaster Reduction
UN-SPIDER	United Nations Platform for Space-based Information for Disaster Management and Emergency Response
WFP	World Food Programme





Khartoum, Urban Flooding  
Source: Atif Saad photography

# Chapter 1: Introduction

## 1.1 Introduction

Climate change, extreme weather events, and frequent disaster hazards are becoming the reality we live in, and advancing research in disaster risk management is an urgent need. which requires a better understanding and preparedness for disasters from scientists, professionals, politicians, and civil society.

While the research on technical solutions to prevent and adapt to disaster is progressing rapidly, the research on the communities and institutions that are supposed to manage and conduct these technologies is still not sufficient. Although the importance of community engagement and building institutional capacities has been highlighted in many international platforms and frameworks concerned with Disaster Risk Management (DRM) (IPCC, 2012; United Nations, 2015), the specifics of how to do that are not clear. Many pioneer researchers in the field like Cutter and Norris attempted to define and measure resilience and vulnerability but until now there is no universal consensus on how to do that.

We believe that the first step in measuring something is to fully understand it; this research takes a deep dive into exploring community resilience, and institutional vulnerability in the context of the global south, more specifically, in Sudan one of the most fragile countries (The fund for peace, 2022), where floods are the most recurrent disaster, affecting and displacing thousands of Sudanese every year (OCHA, 2022a), this context representing a typical country from the global south, resilience, and vulnerability are being examined, trying to address the factors affecting them, and empirically understand their dynamics and interlinkages, paving the way to further measure them and allowing for better planning regarding disaster risk management.



## 1.2 Research problem

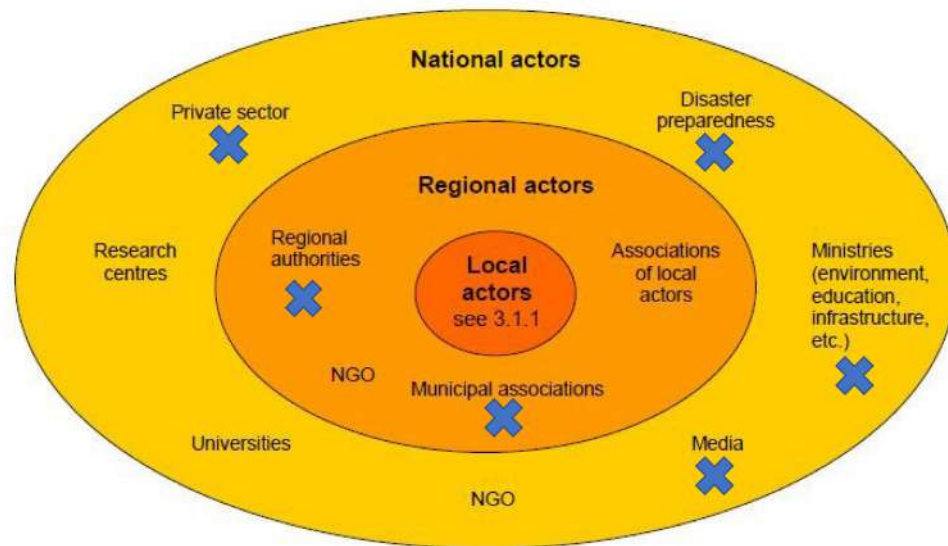


Figure 1- National and regional actors in disaster risk management  
Source: (GTZ, 2003)

With the absence or weak performance of the state in the global south where the 60 most vulnerable states are located (Bündnis Entwicklung Hilft, 2021), local communities find themselves alone facing disasters.

A fragile and vulnerable state means that in case of disaster many systems will malfunction, and many actors of the Disaster Risk Management DRM will go out of the scene, actors like ministries, regional authorities, municipalities, and in extreme cases the private sector and media can stop functioning as well. Only a few actors might have the capacity to stand with local communities in such circumstances, like academia by doing research and Non-Governmental Organizations NGOs who have the capacity to do so.

This research tackles the above mentioned problem, trying to understand it better and provide recommendations on how to better plan to overcome it.

## 1.3 Research objectives

The generic objective of this research is to contribute to a field of research that is relatively new and in urgent need of progress, especially in the global south. The specific objectives are:

- Understanding the current situation of DRM institutions in Sudan.
- Exploring the intersections between the roles of the community and the DRM institutions.
- Recommendations to map the way forward for collaboration between local communities and DRM institutions in Sudan.

## 1.4 Research Questions

This research aims to answer the following questions:

- How does the institutional vulnerability of DRM institutions look like in responding to floods in Sudan?
- What coping and adapting capacities (resilience) do the flood-prone local communities in Sudan have?
- What are the specific aspects that local communities can help the DRM institutions in?

The answers to these questions are expected to give a deeper understanding of community resilience and institutional vulnerability in a fragile state context from the global south.

## 1.5 Research Methodology

The research methodology depended on first highlighting the importance and relevance of the topic of DRM in our lives and the academic literature, its importance to the global south and Sudan, leading to the three research questions R.Q., followed by exploring the already existing literature to know the state of the art, using tools like desk research and document analysis for around 50 documents of academic articles, books, and literature review. Then setting the context of Sudan and the background of the two case studies intended to be examined.

After that comes the empirical part, first by reviewing the DRM institutions in Sudan, through document analysis (legal documents, official reports, and grey literature), semi-structured interviews with officials, and desk research. Second by analysing the two case studies through semi-structured interviews and online questionnaires. After the institutional review and case study analysis the

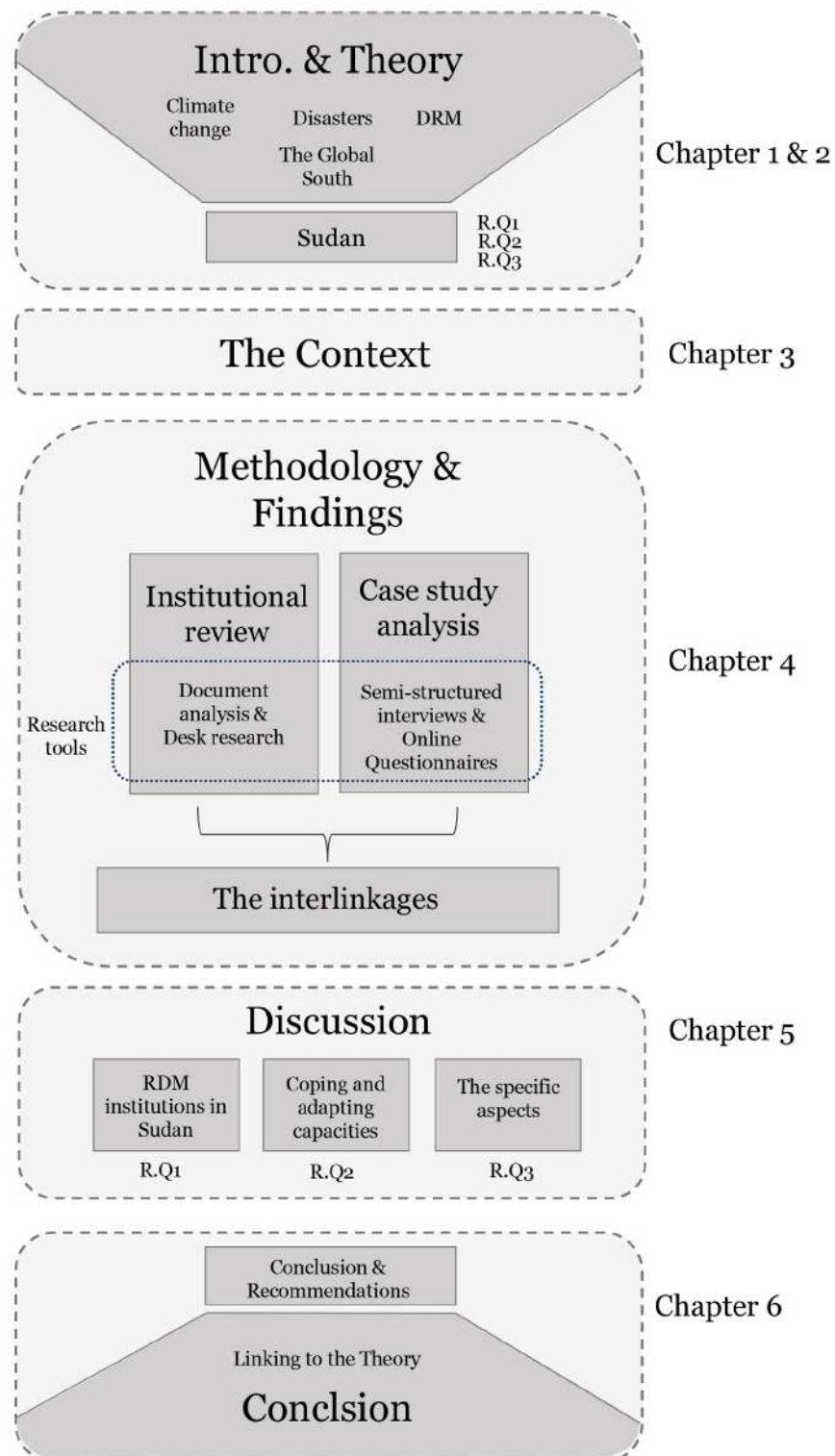


Figure 2- Research Framework  
Source: Author

interlinkages under examination are mapped. The discussion mainly focused on answering the three research questions and linking them to the literature. Finally, a conclusion and set of recommendations are provided followed by a link back to the theory that the research started from.

The second part of the empirical study depended on comparing two case studies, the first one is a community in Sudan known to be resilient to floods through literature and awards from international organizations, the community is unique because of many aspects and context specifics that contributed to its resilience, and the second case study is also a community in Sudan, a typical village that has been hit by floods in 2022, despite the disaster the community showed some resilient actions in the response to the flood like community collective actions in rescue.

The study attempts to understand the specifics that made the first community resilient, by taking it as a unique abstract situation represents the resilience to floods in Sudan and comparing it to the other community that is a typical mainstream community suffered from the flood disaster just like many other communities in Sudan, this comparative study will help to understand which aspects are unique to the first community only and which can be found in other communities as well to help them better improve and build their resilience as well.



Flood destruction and an attempt to rebuild  
Almakylab, Sudan  
Source: Author



## Chapter 2: Theoretical Background

### 2.1 Key Concepts: Hazard, and Disaster

Hazard and Disaster are words we hear frequently in the news lately, they sound close but the difference between them is significant, while hazard is “a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage” (UNISDR, 2009), disaster as, as defined by the (IPCC, 2012), “Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require an immediate emergency response to satisfy critical human needs and that may require external support for recovery.”

Birkmann (Birkmann, 2013) explained the relationship between hazard and disaster risk by the equation:  $\text{Risk} = \text{Hazard} \times \text{Vulnerability}$

In other words, a phenomenon is considered a hazard or disaster depending on whether it causes losses to humans, livelihoods, the natural environment, and the built environment, or not.

### 2.2 Disaster Risk Management DRM

The international recognition of the importance of Disaster Risk Reduction DRR and setting international agenda for it started in the early 90s with the Yokohama Strategy, followed by the Hyogo Framework for Action in 2005, and most recently the Sendai Framework for Disaster Risk Reduction in 2015, all these frameworks and strategies played an important role in grabbing the international attention to the importance of DRR in the light of the consequences of climate change, yet more recognition is needed in both the discourse and practice of involving community-level actors in the planning and implementation of DRR (La Tozier de Poterie and Baudoin, 2015).

Although the two terms Disaster Risk Reduction DRR and Disaster Risk Management DRM might be used interchangeably, Disaster risk management DRM has a broader perspective, defined by (United Nations, 2009) (UNISDR, 2009) as “The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies, and



improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster”, on the other hand, DRR is also defined by (UNISDR, 2009) as “The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events”. In other words, DRM concerns with managing all phases of disaster (preparedness, mitigation/ response, and adaptation). It is evident that DRM needs to go hand in hand with sustainable development (Uitto and Shaw, 2015; UNISDR, 2004), as a huge amount of resources, livelihoods, human lives, and the built environment could be saved with good disaster management.

Two important concepts or terminologies usually appear in the of disaster risk management; Resilience and Vulnerability, while resilience is defined as “...the capacity to absorb shocks while maintaining function. When change occurs, resilience provides the components for renewal and reorganization” (Folke et al., 2002), Vulnerability is defines as “...the flip side of resilience: when a social or ecological system loses resilience it becomes vulnerable to change that previously could be absorbed (Kasperson and Kasperson, 2001), the two definitions show that resilience and vulnerability are two faces of one coin where one is the absence of the other, which indicate that the four pillars of vulnerability (Social, Institutional, Financial, Environmental) identified by (Birkmann, 2013) applies for resilience as well, this research will be focusing on the social and institutional pillars mainly, but also not ignoring the financial and the environmental aspects since that all the four pillars are strongly connected ,and affecting and being affected by each other.

One of the approaches to measure vulnerability and resilience is through measuring two components of them; coping capacity and adaptive capacity, the (IPCC, 2012) defines coping capacity as “The ability of people, organizations, and systems, using available skills, resources, and opportunities, to address, manage, and overcome adverse conditions”, while it defines the adaptive capacity as “The combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities”, the two definitions shows the connection to resilience\_ and by default vulnerability\_, as the coping capacity is related to the ability to face adverse conditions, and the coping capacity is related to overcoming the adverse conditions, learning from it, and building back better. The two terms coping and

adapting capacity are used in the literature interchangeably and with an overlap in their meaning, for example, it is not clear where disaster preparedness falls within the two terms, some scholars consider that the anticipation of disaster is under the coping capacity (Parsons et al., 2016), while the IPCC considers the disaster management as a loop and that after learning from the adverse condition comes the better preparedness. Although we agree with the perspective of the IPCC, for the sake of this research, the ease of attributes analysis, and the direct effect of preparedness on coping capacity and disaster response, we will consider disaster preparedness as part of the coping capacity.

The literature on measuring resilience and vulnerability is relatively new, but the need to develop it is urgent, many frameworks and models have been developed to measure resilience and vulnerability since the early 2000s, but these frameworks are still generic and broad and the context is highly relevant (Irajifar et al., 2013) to choose the right framework or applicable attributes, moreover, the different frameworks have different conceptual approaches and it is hard for one framework to cover all the dimensions of vulnerability (Birkmann, 2013) and/or resilience.

### 2.3 Global South and the Southern Theory

The term Global South “Is one of a family of terms, including “Third World” and “Periphery,” that denote regions outside Europe and North America, mostly (though not all) low-income and often politically or culturally marginalized” (Dados and Connell, 2012) (Bündnis Entwicklung Hilft, 2021), the term spread in the academic filed with the cold war.

From there came the term southern theory referring to the knowledge produced from or about the global south, Raewyn Connell one of the prominent contributors to the southern theory says: “Southern theory” is a term I use for social thought from the societies of the global South. It’s not necessarily about the global South, though it often is” (Connell, 2022)

As part of the social sciences, urban studies have affected and been affected by the southern theory, new lines of thought calling to go beyond the conventional planning theory (Watson, 2009b) that is typically borrowed from the North have taken a strong position in the discourse. On the other hand, Disaster studies as an integral part of urban studies are rarely looked upon through the southern theory. The importance of the southern theory when studying and understanding DRM lies in the fact that resilience and vulnerability are different in the global north

than in the global south, which imposes different realities and dynamics that are not realized In the global north, and Since the top 60 Vulnerable countries are located in the global south (Bündnis Entwicklung Hilft, 2021), and 325 million extremely poor people are expected to be living in the most hazard-prone countries in 2030, many of them fragile and conflict-affected states (Shepherd et al., 2013) (namely the global south); it is important to understand resilience and vulnerability through a southern lens, what are the potentials of this part of the world, and what are the dynamics of DRM there.

Furthermore, the importance of the research topic and viewing it through a southern lens is decreed by the fact that international Disaster risk reduction DRR frameworks like the Sendai Framework<sup>(1)</sup> assume that there is a functioning government and an active civil society (Walch, 2018), while that is not the situation in most of the countries in the global south. This research helps illustrate how the situation looks like regarding DRR in one of the most fragile countries in the world, by taking a deep dive into the dynamics of resilience and vulnerability through a case study from the global south and views from the south.

## **2.4 Contemporary Views in DRM: Co-production, Community-based DRM and DRM Decentralization**

The role of community involvement in the national and regional plans of DRM has been highlighted in the literature, which links to an important concept in the southern theory namely Co-production<sup>(2)</sup> ; putting the community as an important player in the provision of public services including DRM. Two more closely related concepts to the co-production, but more tailored to the context of DRM are first: Decentralization of DRM which “Is the best allocation of competencies and responsibilities must be found for the specific setting” (GTZ, 2003) and Community-based DRM which “denotes the application of measures in risk analysis, disaster prevention and mitigation and disaster preparedness by local actors as part of a national disaster risk management system” (GTZ, 2003), all these concepts put the community as a key player and calls for close collaboration between the authorities and the community to achieve the best preparedness, response, and adaption to natural disasters. The importance

of community involvement in times of disasters arises from the spontaneous behavior of the community members of being the first responders to provide help and aid to each other until relief and rescue bodies arrive, moreover, local communities usually tend to have their own environmental knowledge that could help the authorities better build their databases and DRM policies and plans.

## **2.5 Community Resilience and its Attributes**

The literature on measuring resilience and vulnerability is relatively new, but the need to develop it is urgent, many frameworks and models have been developed to measure resilience and vulnerability since the early 2000s, but these frameworks are still generic and broad and the context is highly relevant (Irajifar et al., 2013) to choose the right framework or applicable attributes, moreover, the different frameworks have different conceptual approaches and it is hard for one framework to cover all the dimensions of vulnerability (Birkmann, 2013) and/or resilience.

Until now there is no one commonly agreed upon definition of community resilience but many definitions depending on the background and conceptual approach to it, and thus there are many frameworks to measure it. Two prominent schools of thought dealt with community resilience, the first is Norris who looked at resilience as a metaphor since the term “Resilience” is borrowed from the field of physics and mathematics to describe the ability of a material to return to equilibrium after displacement (Norris et al., 2008), Norris also defines community resilience as “A process linking a set of networked adaptive capacities to a positive trajectory of functioning and adaptation in constituent population after a disturbance”, moreover she identifies these adaptive capacities as Community competence, Social capital, Economic development, and Information and communication. The second is Cutter that takes a more practical stand and emphasizes the importance to measure resilience numerically, Cutter proposes a benchmarking baseline to measure disaster resilience with qualitative and quantitative variables under the following categories: Social resilience, Social capital, Economic resilience, Institutional resilience, and Infrastructure resilience (Cutter et al., 2010). We notice that she separated community capital from social resilience although they were considered as one in Norris’ s framework, also most of the qualitative variables like place attachment and social capital came under community capital, while the quantitative variables like health coverage and special needs came under social resilience, this confirms that the understanding

1. The Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) was the first major agreement of the post-2015 development agenda and provides Member States with concrete actions to protect development gains from the risk of disaster (UNDRR (2023).

2. Co-production is “...the critical mix of activities that service agents and citizens contribute to the provision of public services” (Brudney and England (1983)

of resilience varies according to background, approach, and context. Following Norris's school of thought about resilience and recognizing the importance to measure resilience; a framework called the Conjoint Community Resiliency Assessment Measure (CCRAM) has been developed to measure community resilience, this framework took qualitative aspects and assigned weight to it to get numerical quantity representing the resilience of a community, the components of this framework are: Leadership, Collective efficacy, Social trust, Place attachment, and preparedness. As mentioned before, there are many other frameworks to measure community resilience, this framework is found to focus on community resilience exclusively, while most of the other frameworks put indicators or factors that integrate highly with other aspects of resilience like financial resilience or environmental resilience, Although this might be the case in practice for the sake of the study and putting community resilience on the focus, this framework is used as bases for the attributes in the imperial study.

## 2.6 Institutional Vulnerability and its Attributes

Just like community resilience, or resilience and vulnerability in general, the research on these topics is relatively new and the literature on them is very limited.

There have been several attempts to understand, analyze, and measure institutional vulnerability. One of the pioneering works in exploring institutional vulnerability is the work of Jonatan A. Lassa where he explores the basis of institutions and how it emerges from the community itself, and it can be both formal (regulation, rule of law, constitutions, codes, bureaucracy, etc.) or informal like (culture, norms, traditions, religion) (Lassa, 2010), he highlights the importance of institutions to disaster risk management by saying “without considering institutions, institutional quality, and specific governance of disaster reduction at macro-, meso- and micro-scales, disaster risk reduction will not be sustainably implemented”. Lassa also investigated the international frameworks to measure institutional vulnerability and concludes that they come to measure the regulatory quality, government effectiveness, participation, and political context. Another Austrian research team explored the drivers of institutional vulnerability and how it interacts with other dimensions of vulnerability through a framework they presented, they consider the pillars of institutional vulnerability as the Socio-cultural pillar, Socio-political pillar, Legislative and regulatory pillar, and Fiscal economic pillar. They also conclude that “institutional vulnerability is

an ‘umbrella’ dimension strongly related to all other dimensions and has to be approached as such in order to reduce vulnerability and, consequently, disaster risk” (Papathoma-Köhle et al., 2021).

Cutter also tried in her framework of resilience to look into the flip side of institutional vulnerability, she thinks that institutional resilience can be measured through mitigation plans and social connectivity, municipal services, flood coverage policies, political fragmentation, and previous disaster experience (Cutter et al., 2010), these dimensions clearly interlink with other resilience dimensions like social and financial resilience. To conclude, it is obvious that the four pillars of resilience and vulnerability are hardly separable, but in order to study them researchers had to categorize them, and for the sake of this research some attributes of institutional resilience/ vulnerability will be categorized under community resilience/ vulnerability, like previous experience and organization because it concerns both the community and the institutions, then the interlinkages and roles are examined. The institutional aspects of the attributes contain the roles of the state, the NGOs, and the community, also contains the resources acquisition, distribution, and mobilization, and lastly, it contains the institutional satisfaction for the community towards the state performance, the NGOs performance, and even the community leader's performance.





**Khartoum, The Nile, and Tuti Island**  
**Source: Atif Saad photography**

## Chapter 3: The context

### 3.1 About Sudan: Background

Sudan is a sub-Saharan country located in the northeastern part of Africa, bordered by 7 countries and has a total area of 1.868 million km<sup>2</sup> (World Bank, 2023a) and 18 different provinces, with a population of 45 million divided equally between the two genders and 41% of the total population is under the age of 14 (World Bank, 2023b), the ethnic background of communities in Sudan are very diverse, including Arabs, Nubians, Zagawa, Copts, and more (Mwaniki, 2016), a common characteristic between these different communities is the strong family relations. (Cultural Atlas, 2023).



Figure 3- Sudan Map  
Source: Author based on multiple sources

The nature of Sudan is also very diverse; with 4 ecological zones grading from the desert in the north to semi-desert in the central areas, and ending with woodland (Savannah) and mountain vegetation in the south (Mohamed et al., 2016). Moreover, Sudan has 3 permanent rivers, 7 seasonal rivers, and many seasonal streams (Oberheu, 2016), and the average temperature in Sudan is 32 (World Bank, 2023c), all these factors make Sudan vulnerable to climate change and extreme weather events causing many natural disasters like drought, heat stress, desertification, and floods, with floods accounted for the 44% of the total natural disasters (International Bank for Reconstruction and Development, 2021), which is the disaster type under study in this paper.



The economic situation puts Sudan among the poorest countries in the world, with 43% of the total population under the poverty line of 3.2 \$ per day (World Bank, 2020), since 2018 the GDP of Sudan has been going in negative, with an informal sector of 35% (World Economics, 2023). The main economic activities are agriculture 20%, industry 23%, and services 36% (Statista, 2023).

All these economic challenges are closely related to the political situation that has been facing Sudan since its independence in 1956 when the elected government has been faced with a military coup after only 3 years and followed by a civil war in the south after 6 years. During the history of Sudan, 4 military coups took place to seize power, and three civil wars accounted for over 30 years of armed conflict that resulted in the separation of South Sudan in 2011, although the reasons for these wars varied from conflict over resources and power, they all resulted from cultural conflicts with a tribal trait (Dean, 2000). Most recently in 2018, a civil revolution took place demanding a democratic civilian government, as a result, the regime has changed and a transitional period of 4 years started with the leadership of the civilians and military, in October 2021 a military coup interrupted this period, and finally, in December 2022 a framework agreement has been signed to return to a civilian-led transition (Al Arabiya English, 2022; BBC News, 2011; European Union, 2022), and not long after in April 2023 a war started between the military and a paramilitary group in the heart of the capital Khartoum. All this instability in the political situation and the absence of democratic practices is definitely affecting the institutions and their quality in Sudan; making them vulnerable and unfunctional.

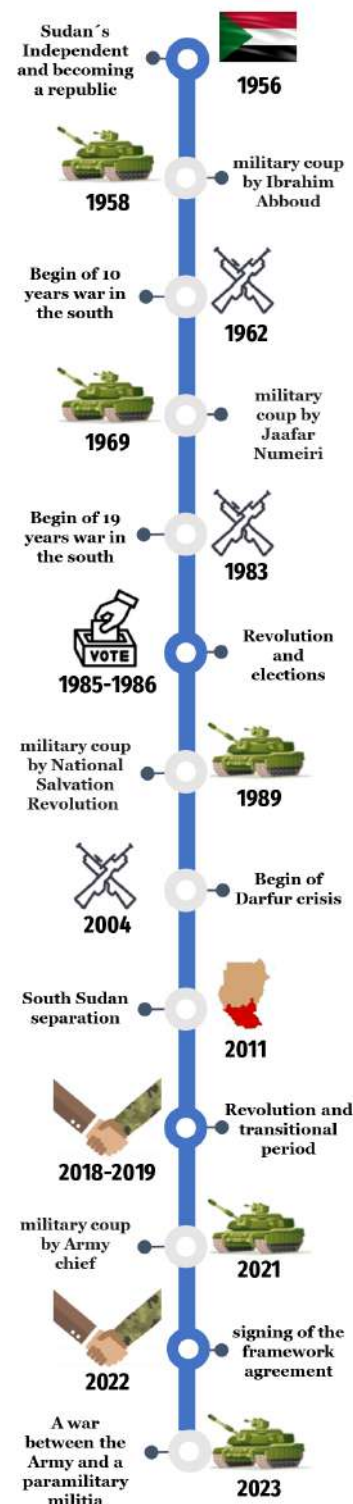


Figure 4- Sudan political timeline  
Source: Author based on multiple sources

### 3.2 Case Study I: Tuti Island

The case study is an island called Tuti located in the heart of the Sudanese capital Khartoum, at the confluence of the Blue Nile and White Nile, with a total area of 8 km<sup>2</sup> and a population of 18000 inhabitants (UNDRR, 2015), the island faces the risk of the Nile flood every year during the rainy season between July and October.

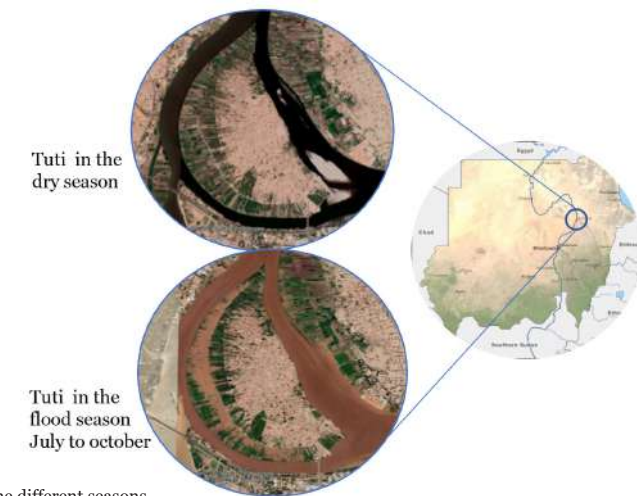


Figure 5- Tuti island in the different seasons  
Source: Author based on multiple sources

The Island has been defending itself against the risk of flood for decades, the first documented event of flood protection is in 1946<sup>(3)</sup>, yet other previous attempts to prevent flooding might exist but weren't documented. The people of Tuti have developed their own way of flood defense through a system called Tayas (Felci and Altom, 2022).

The Taya is: a group of people responsible for a specific area, and their number ranges between 10 to 15 people, they are responsible for building the flood barrier and monitoring the water level and the barrier condition, Taya members take shifts in monitoring the river and in the case of river water leakage they issue a call for help so all the islanders come and help them <sup>(4)</sup>, Tayas are located around the island in the danger areas where the flood is expected to come from. In the year 2015 the community of Tuti island has been awarded champions of disaster risk reduction (UNDRR, 2015), the case study is an ideal illustration of community resilience where community roles are tangled with institutional roles responding to a basic need of survival.

3. Interview with Mr. Mohammed Alamin, a witness of the 1946 flood.

4. Interview with Mr. Khalid Ahmed, the chairman of the flood prevention committee in Tuti for the year 2020.

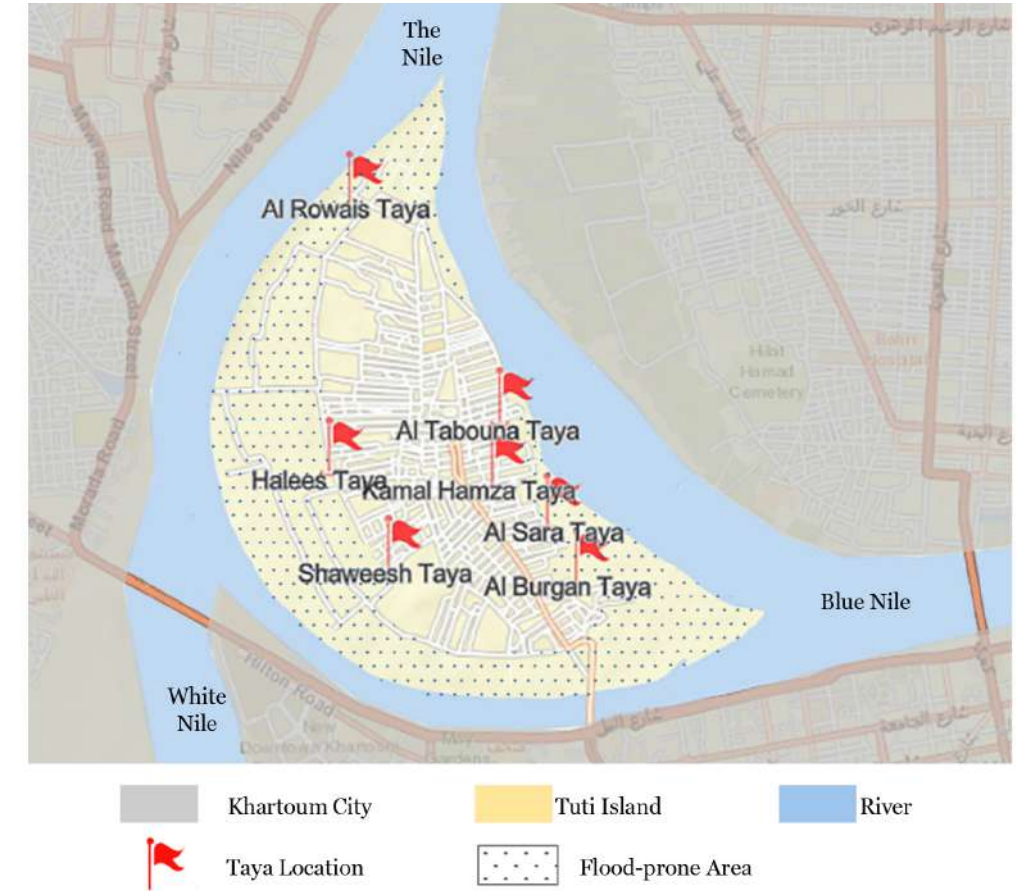


Figure 6- Tayas Map  
Source: Author based on multiple sources



Figure 7- Taya system  
Source: (Felci et al., 2020)

The study of community resilience in contexts of communities faced with recurrent disaster risk to better understand the local management capacities and systems has been recommended by prominent scholars in the field of resilience like Berkes, Colding, and Folke (Berkes et al., 2008).

### 3.3 Case Study II: Almakaylab Village



Figure 8- Almakaylab.  
Source: Author

Almakaylab is a small village of 10,000 inhabitants and with 8.5 km sq, located in Berber district in the River Nile state in northern Sudan. The district faced heavy rainfall in the autumn of 2022, causing flash floods that destroyed many houses in several villages. Almakaylab was the most affected village in the district, with almost 500 houses destroyed totally or partially, luckily no one died or was injured but the financial loss of the destroyed houses was considerable.

In this case study the community has been hardly affected by a flash flood that they have never experienced something like it, although they are used to the flash flood that comes through specific creeks in the village, the creeks never flooded so severely before.



Figure 9- Almakaylab after the flood  
Source: Author based on multiple sources



This case study represents the typical predominant situation in many of the Sudanese villages affected by floods, the analysis and comparison of it to the first case study is important to understand what similarities they have and what could be done better to be more resilient to floods.

Both case studies chosen have rural features, even Tuti Island with its location in the heart of the capital has these rural features (Felci and Altom, 2022), the purpose is to examine community resilience in a rural context that is expected to have high resilience (Rapaport et al., 2018) in order to understand it better.

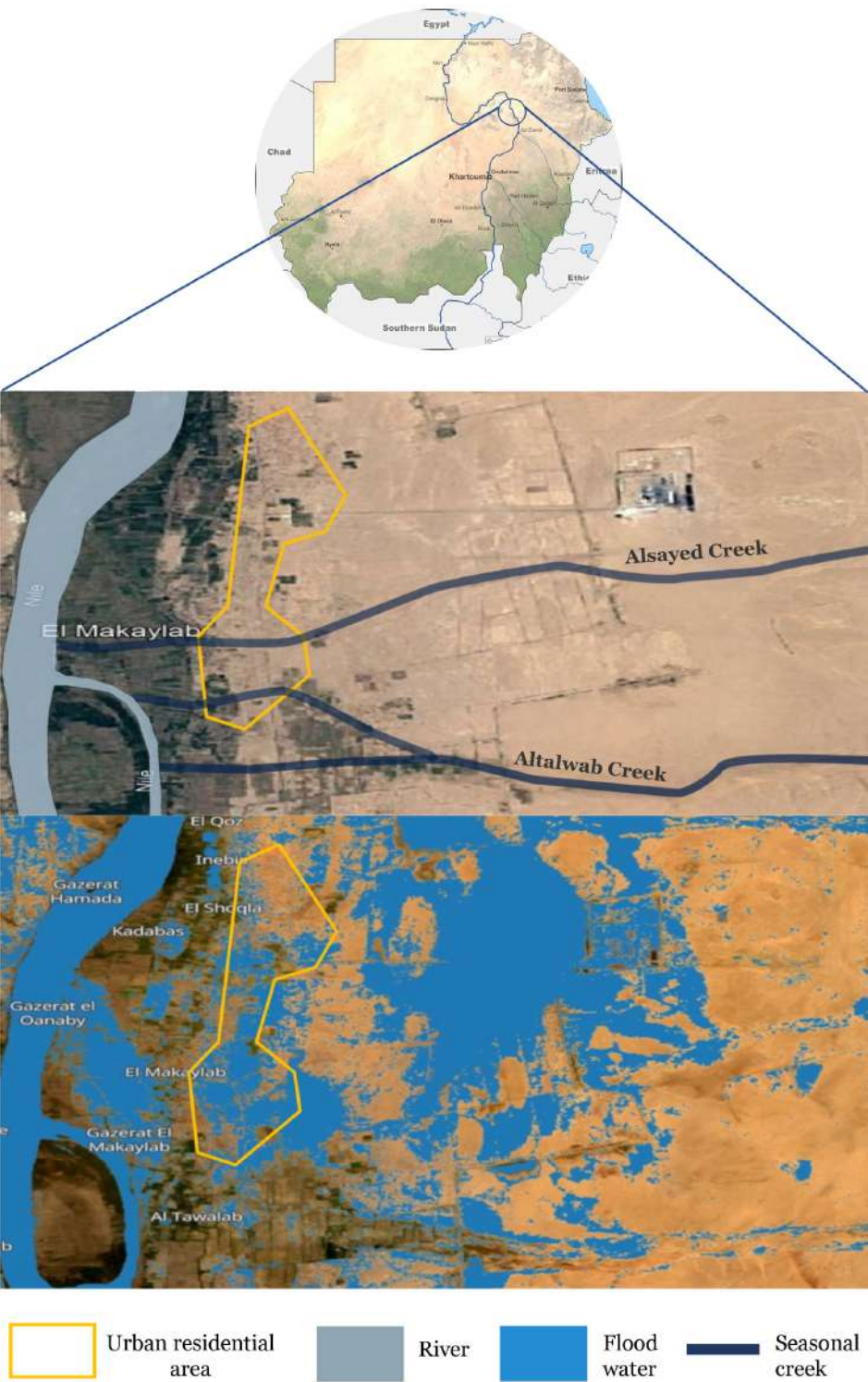


Figure 10- Almakaylab seasonal creeks and flood coverage.  
Source: Author based on multiple sources



## Chapter 4: Methodology and Findings

### 4.1 Methodology

The Methodology for the institutional review aimed at understanding the current situation and structure of the DRM institutions in Sudan, so the review depended on desk research, document analysis of around 30 (legal documents, official reports, and grey literature), and lastly semistructured interviews with officials. The methodology for the case study analysis was more complicated than the institutional review, The research questions typically examined qualitative attributes of community resilience and institutional vulnerability, attributes like Leadership, Social trust, Collective efficacy, Preparedness, Place attachment, Legitimacy, and Satisfaction with institutional performance, these attributes have been extracted from the literature. Therefore, qualitative data collection methods were used for both of the case studies, like Observation, in-depth semi-structured interviews, and focus group discussions, moreover, a questionnaire was conducted for each case study to get a quantitative sense of the data collected in the interviews and to get a wider sample than the one of the interviews. The design of the research was to have one unique case study that represents the pure abstract environment of community resilience as the baseline or reference where community resilience and institutional vulnerability are examined first, and then one normal case study that represents the predominant environment where the community resilience and institutional vulnerability is examined second. The design and sequence of how this part was conducted are important to understand it, first the interviews for the first case study \_that is known to be resilient\_ were conducted to understand the dimensions of their resilience and their interlinkages with the institutional aspects, then a questionnaire was conducted for the quantitative verification, secondly, the interviews were conducted for the second case study and followed by the questionnaire, lastly, the qualitative and quantitative data from the two case studies were compared to each other.

A temporary shelter after flood in Almakaylab  
Source: Author



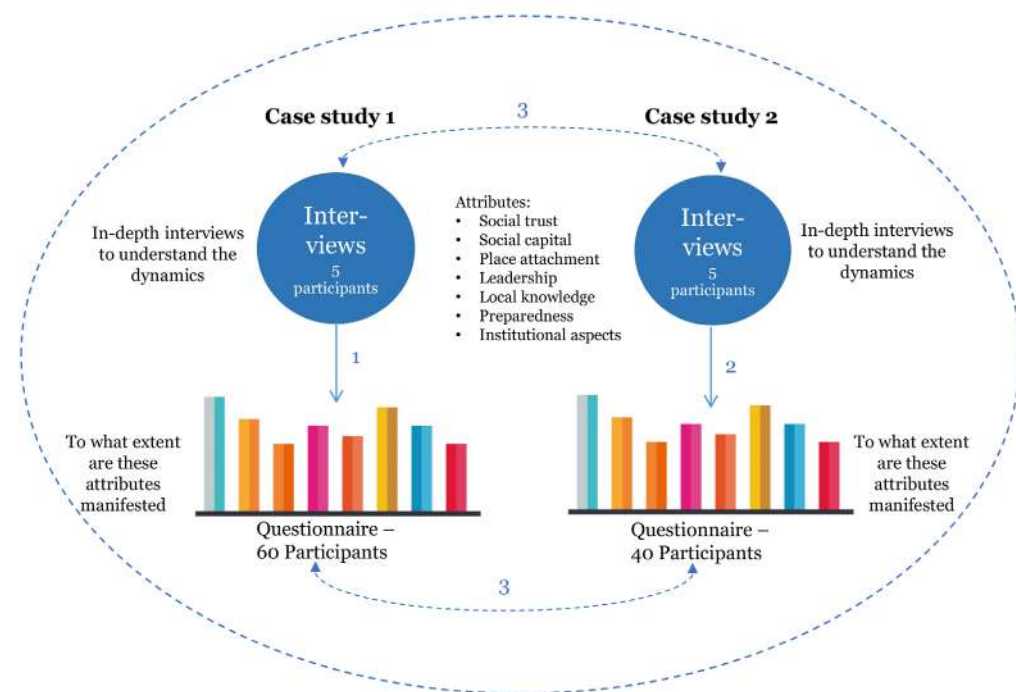


Figure 11- Case studies analysis Methodology  
Source: Author.

The data collection period took 3 months, from 15.02.2023 to 15.04.2023, almost 1,5 months for each case study, in the first case study 6 in-depth interviews and one focus group discussion were conducted, after that a 49-question questionnaire was distributed on Facebook, and WhatsApp groups concerning the local community in the first case study, the questionnaire consisted of 8 sections each section focusing on one or two of the attributes that needed to be measured, 64 people submitted their responses and the target group was 50.

In the second case study, 4 in-depth interviews and one focus group were conducted, then a 52-question questionnaire was also distributed in the local Facebook and WhatsApp groups of the local community, the questionnaire consisted of the same 8 chapters, similar to the first case study with the addition and modification of some questions, 40 people responded and the target group was 50.

The semi-structured interviews were qualitatively analyzed after transcribing them a basic coding method of content analysis was applied to the transcripts, the content was first deductively analyzed by examining the attributes of community resilience and institutional vulnerability that were extracted from the literature. Then an inductive analysis was applied to search for relevant themes relating to the different attributes, the purpose of the inductive analysis was to get a second look at the data without preset determinants in order to get a better understanding

of community resilience and institutional vulnerability.

Google Forms provided an instant visual representation of the questionnaire data in charts, diagrams, and tables; some refining of the data was done to avoid redundancy. Most of the questions in google forms were multiple choice questions where participants could choose more than one option, therefore the sums of the percentages might be higher than 100%, the reason behind the questions was not to get exact numbers and percentages but more to get an understanding of the attributes and their effects in social resilience and institutional vulnerability.

### Limitations of the research

On the 15th of April 2023, a war started in Sudan causing the interruption of telecommunication and the general order in Sudan, by that time all the interviews were already conducted and only the questionnaire of the second case study was left, on the 28th of April the researcher decided to move on with distributing the questionnaire, the remote Geographical location of the case study from the center of the conflict in the capital Khartoum made it possible for the local community to remain safe, the main challenge was the bad internet connection, the targeted responses was 60 like the first case study, but due to this challenge, the actually received responses were 40, for this reason, it was more practical to present the responses in percentages.

Moreover, the war situation made it impossible to meet the official from the different institutions, officials from the civil defense and NGOs were planned to be interviewed, the only successful try was interviewing employees from the Remote Sensing Authority. Adding to this challenge in the institutional review is the limited number of official documents available to the public.

Lastly, the fact that the questionnaires were online, made them only accessible to people with smartphones, internet access, and technical knowledge to fill and submit the form; this has resulted in a low percentage of elderly participants (6 % in both case studies), although their views were important in the interviews.

## 4.2 The Findings

### 4.2.1 A review of DRM institutions in Sudan

#### *National level*

When a disaster strikes \_typically\_ eyes would be on the official institutions concerned with disaster management as they would be the main ones responsible for disaster preparedness, response, and adaptation, so who are those institutions in Sudan?

The civil defense Act of 2005 in Sudan mentions that the main responsible for both natural and manmade disasters response in Sudan is The National Council of Civil Defence (NCCD) (The Republic of the Sudan -Ministry of Justice, 2005), it also states that this council is under the auspices of the president of the Sudanese republic and formed upon the recommendation of the minister of interior, yet the performance of the civil defense in each Sudanese province is regulated by the state law after consultation with the council. This council works on the national level and is concerned with national plans for disaster preparedness and response, approving national disaster budgets, specifying the roles of ministries and different authorities for disaster protection, attracting and assisting aid from local, regional, and international organizations, and lastly providing support to the local province governments in case they are not able to face disaster or emergency situations. In the same above-mentioned act, under the NCCD comes the general administration of the civil defense police, this one is regulated by the Police Act 2008 and the province law in which it is performed, the roles of the general administration include various disaster response roles from rescue activities, first aid and ambulance services, food and water emergency provision, and firefighting services, in addition to preparing evacuation plans, training plans, establishing early warning units, and recommendation of areas need to be declared as a national disaster and emergency area. The organizational or institutional relationship between the NCCD and the general administration of civil defense police is not clear \_and not stated in the civil defence act\_ yet it appears that the latter is the executive arm of the former.

In 1995 the Humanitarian Aid Commission HAC was established by merging two previous commissions concerned with disaster management (Ahmed, 2004), According to the Voluntary and Humanitarian Work Regulation Act of 2006 (The Republic of the Sudan -Ministry of Justice, 2006), the responsibilities of HAC regarding disasters are raising awareness about humanitarian work, training on disaster management, resource mobilization, project initiation, coordination

and mobilization of internal and external efforts, and monitoring and evaluation. The act also states that the head of the commission shall be appointed by the president of Sudan on the recommendation of the minister of welfare and social security. Moreover, the act mentions that all non-governmental charitable and voluntary organizations must be registered at the general registrar of voluntary and humanitarian work organizations, the registrar is also appointed directly by the president of Sudan on the recommendation of the minister of welfare and social security, exempted from this registration the UN and all its specialized agencies as well as the International committee of the Red Cross, but they have to sign a technical agreement on the humanitarian field work and obey with principles of humanitarian work. As the act indicates, all the humanitarian work of the local NGOs and INGOs must be organized by the HAC. The above-mentioned information already shows overlapping and duplication in the roles of the different institutions concerned with disaster response in Sudan.

The document review shows that the majority of humanitarian work and disaster responses in Sudan are actually handled by NGOs, the humanitarian work has two main categories; one responding to armed conflicts resulting in displacement and refugees in need of humanitarian aid, and the other is responding to climate change and natural disasters. The Sudan Multi-Year Humanitarian Strategy 2017- 2029 (OCHA, 2017) shows that the refugee humanitarian work is mainly handled by the UNHCR and the Commission for Refugees (COR), while the rest of the humanitarian work from other causes is handled by the other NGOs operating in Sudan. Moreover, Sudan Emergency Response Preparedness Plan (OCHA, 2022b) shows how the different NGOs work under the leadership of HAC to form what is called Inter-Cluster Coordination where the humanitarian work is divided according to the specialty of each INGo; for example, WHO for health while WFP & FAO for food security and livelihood, the document also shows that each one of 18 provinces of Sudan is assigned an NGO responsible for it in case of emergency (e.g the Commission of Voluntary and Humanitarian Work CVHW for Khartoum state and Save the Children for River Nile State). Although it is not clear how many NGOs are operating in Sudan, the 2023 humanitarian response plan (OCHA, 2022a) shows the dependency on 91 local and international NGOs to perform the humanitarian response with a total budget of 1,7 billion US \$ provided by the NGOs and their donors, on the other hand, there was no mention of the budget allocated by the for humanitarian or disaster response in this document or any other document.

It was also noticed that most of the strategic national plans and reports in Sudan

regarding disaster management were either prepared by NGOs or in collaboration between the national government and the NGOs like the Multi-Year Humanitarian Strategy 2017-2019 that is prepared by OCHA (OCHA, 2017), and the Rapid Post-Disaster Needs and Recovery Assessment prepared by the world bank after a request made by the Ministry of Labour and Social Development to the World Bank Country Director, seeking assistance in assessing the damage and impacts by the floods of 2020 (GFDRR, 2021). Moreover, although the above-mentioned Acts of civil defense and HAC mention disaster preparedness and adaptation/reconstruction, the main focus in the two acts is on disaster response, also in the national plans and strategies the preparedness and early warning of disasters are rarely mentioned.

Regarding early warning and disaster research, there is the Remote Sensing Authority RSA as a part of the national research center, which belongs to the Ministry of Science and Technology. The tasks of the RSA include suggesting space policies and consultations with the government and conducting research on space and disaster. An interview was conducted with Dr. Khalid Alhaj the head of the disaster research department to better understand the roles, collaboration, and challenges of the authority regarding disaster preparedness, he says that there is clear overlap and duplication in the roles of DRM institutions, for example, the main role of RSA is conducting research for early warning and this task is sometimes done by the civil defense, also the tasks of the NGOs and the civil defence overlap, so the interlinkages and coordination between the different institutions need to be improved. Dr. Khalid also mentioned that they collaborate with different NGOs mostly for training workshops and conferences, but there is a lack of collaboration programs and projects; currently, the only project related to the early warning they are working on is a project organized by the United Nations Platform for Space-based Information for Disaster Management and Emergency Response UN-SPIDER where the RSA is the host institute for the project, the project aimed at the institutional strengthening by conducting a training course for the decision makers and local staff on the benefits of space-based information for disaster management. Dr. Khalid concluded by the challenges that the authority faces and that is mainly the financial challenge and the need to update their equipment for data collection and processing, but they can't afford it.

Since that most of the natural disasters in Sudan are of metro-hydrological origin, another institution involved in disaster management, that is the Sudanese Metrological Authority SMA, it's mission is to "provide weather and climate

information and services of quality to help decision-makers to plan and take action to ensure food security, poverty reduction, and a sustainable development" (UN-SPIDER, 2023), although they produce daily and seasonal forecasts the lack a platform to communicate these forecasts to the public; the official website is not functioning and no other platform was found.

#### *Province government level*

As stated in chapter 17 of Sudan's interim constitution (The Republic of the Sudan-Ministry of Justice, 2005), the distribution of legislative and executive powers between the national government and the state government regarding disasters, shows that disasters are mainly the responsibility of the national government because the National defense is under its control, the local province government has only command over firefighting and ambulance services, and the financial support through Charities and endowment, that means even the response to natural disasters in a certain state is not in its hand but in the hand of the central government.

The responsibilities of the NCCD include providing support to local province government in case of disaster, assuming that the latter should first be able to face disasters on its own, yet no clear evidence has been found on the mechanism of how this should happen, for example, Khartoum's Disaster Risk Reduction Action plan 2019-2023 states that each province prepares its contingency plan, including estimated budget and needs, in consultation with the line ministries at the provincial levels, and civil societies including community level. Plans are usually forwarded to the Central Operations Chamber at the center for an initial review by the technical officials from the line Ministries (UNISDR, 2019), despite this clarification it is still ambiguous what the central operation chamber is and what the ministries in line are. It is also important to note that there is no official website for the NCCD or HAC and official documents issued by them are extremely limited.

#### *Regional and International level*

On the regional level, Sudan is a member of many African alliances like the African Union AU, the Intergovernmental Authority on Development (IGAD), Community of Sahel-Saharan States (CEN-SAD), and the Common Market for Eastern and Southern Africa (COMESA), most of these unions have common frameworks, strategies, and policies concerned with disaster risk reductions, unfortunately, "the effectiveness of these mechanisms in stemming the tide of

increasing vulnerability to and impacts of disasters is limited” (IFRC, 2019), and sometimes there is gap in making use of these strategies and integrating it on the national level disaster policies and mechanisms, a simple example, IGAD Climate Prediction and Application Center (ICPAC) provides tailored weather reports and hazard forecasts \_long and short term\_ for each member country of the IGAD, yet the Sudanese authorities are not making use of them on the national or local level to. Moreover, the interview with the head of the disaster research department in the Sudanese Remote Sensing Authority (RSA) revealed that the collaboration between RSA and IGAD is mostly in the form of training workshops from both sides, but without a comprehensive program or project with targets and objectives.

Sudan ratified many international conventions related to climate change adaptaion (CCA) and DRR, like the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, and Sendai Framework (IFRC, 2019), yet the reflection of these conventions on the sudanese DRR policies and parctice is very limited; in 2016 the governemt of Sudan published the National Adaptaion plan (NAP), a review of the plan shows that it is mainly disussing apadtation to climate change without linking it to the disasters emerging from this climate change, moreover, in january 2022 the Sudanese government published the mid term review of the implimintation of the Sendai framework, which is a good step towards comitting to the framework, but the actions and objectives it describes are too generic, it also mentions national strategies issued by the government like the (National Strategy for Risk Reduction 2013 - 2017), this strategy was never published and it doesn't mention weather it concerns the government alone or the other actors of DRM also!

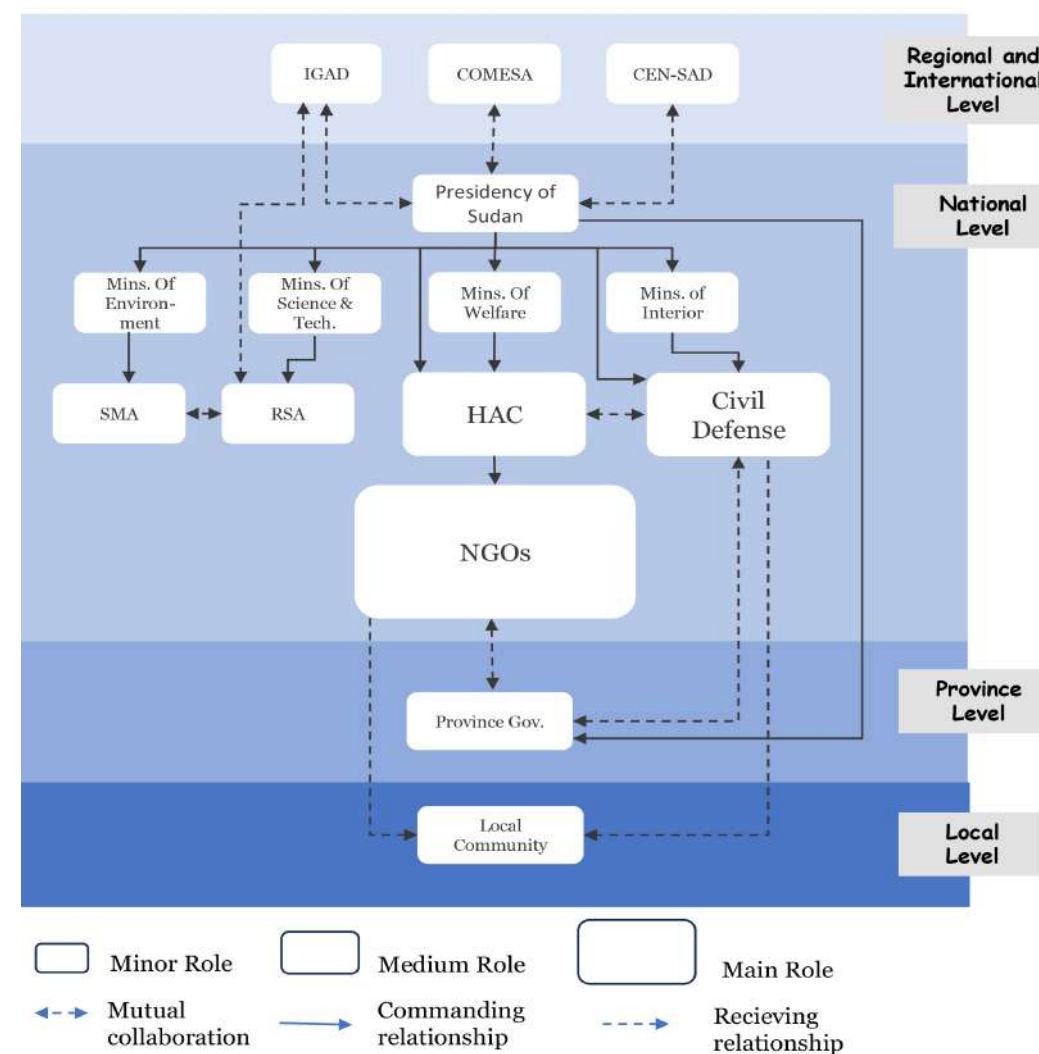


Figure 12- DRM Institutions hierarchy and relationships  
Source: Author.



#### 4.2.2 case studies: Arributes analysis

The following findings will present each attribute of community resilience and institutional vulnerability, illustrating the coping and adaptive capacities of the community and the institutions in a real situation of disaster. Each attribute will be displayed separately with the qualitative findings that were reached through the interviews and then quantitative findings from the questionnaires, for both case studies.

Each one of the attributes has sub-attributes that it is measured through in the analysis, for the sake of simplifying and visually representing the results each one of the attributes will be represented as illustrated below, with the points representing the ideas and stories shared by the participants.

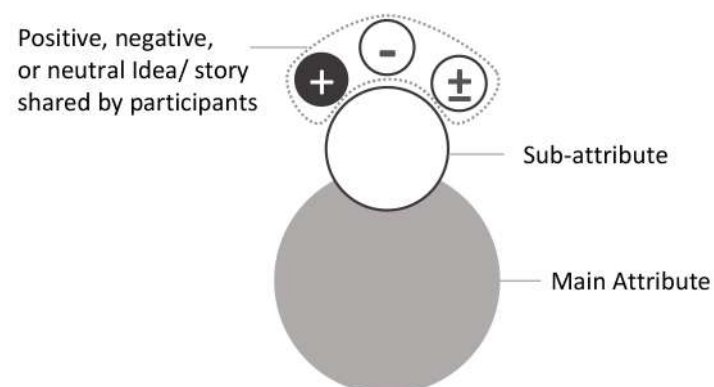


Figure 13- Attributes visual representation  
Source: Author.

#### Collective Efficacy

Collective efficacy is defined as the “social cohesion among neighbors, combined with their willingness to intervene on behalf of the common good” (Cohen et al., 2013).

Collective decision-making in the case of Tuti was mentioned in the interviews describing the general decision-making concerning the common matters of Tuti’s decision-making process and practice during the flood time with an obvious connection to organizational aspects within the community, as well as previous experience, for example: “the Flood Committee meets with the community sub-committees and with those with experience who have witnessed the previous floods and consults about the priorities and how to divide the Tayas”<sup>(5)</sup>

5. Interview with Mr. Mujtaba, vice president of the flood committee.



Figure 14- Collective Efficacy attribute  
Source: Author.

In the case of Almakaylab, the collective decision-making was also mentioned describing how it was conducted before the flood and during the flood relating to organizational aspects, and moreover, the disagreement that led to internal division and withdrawal of legitimacy from the committee and the formation of a new one, “In our current seek to form the new committee we went to the municipality and told them we want to have a representing committee that is recognized officially”<sup>(6)</sup>

The data from the questionnaires came confirming to the high level of collective decision-making in both case studies, with a slightly higher percentage of Almakaylab where around 97% say we always/ most of the time make collective decisions compared to 89% of Tuti. Important to note that taking collective decisions does not necessarily mean agreeing but that the process of collective decision-making is conducted.

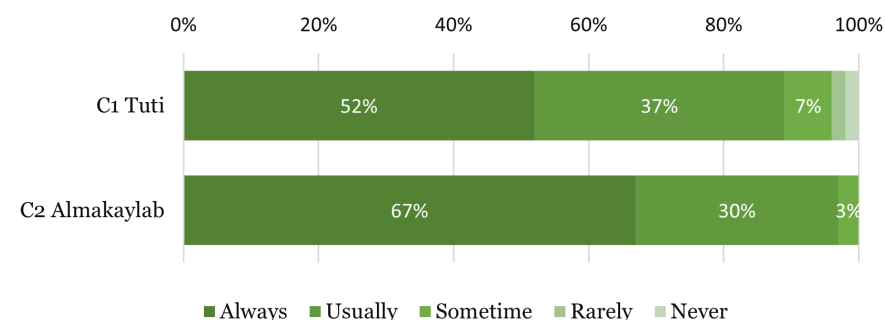


Figure 15- Collective decision making  
Source: Author.

Interview with Mohamed Salih, a former member of the general committee.

Collective actions among the community were strongly evident in both of the case studies, in Tuti it was mentioned mostly in relation to preventive and protective actions against the river flood, with a strong interlinkage to their heritage, and how they/ their ancestors stood against the flood collectively, a Tutian says “The people rolled up their sleeves in that year and became a single block, they fought the River with the fight of the British” . The significance of the collective action is represented in the number of stories about it, represented in the graph above by small circles with plus signs inside. On the other hand, the collective action was evident in the Almakaylab case but mostly related to response and adaptation actions after the flood has happened. Nafeer was also evident in both case studies but mostly mentioned the Almakaylab’sylab case as an adaptation action for the reconstruction of the damaged houses.

The responses from the questionnaire supported the interview data, with the Tuti case showing 86% of the sample thinking the collaboration during the flood was very high, compared to 92% in Almakaylab

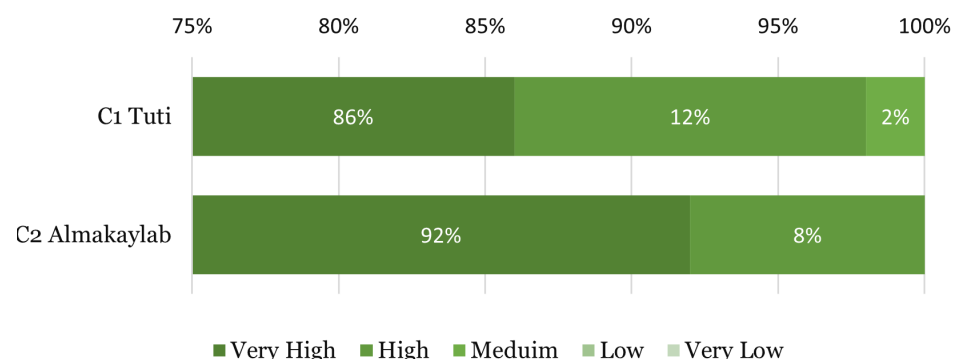


Figure 16- Cooperation during flood  
Source: Author.

The types of collective actions mentioned in the interviews varied from physical work or effort to emotional support, help with knowledge and experience, and donations. The questionnaire shows that almost half of the participants from Tuti helped physically with their effort in building the barricades, followed by emotional support 27% and donations 23%. While in Almakaylab, the highest percentage of collective action was donations 37%, followed by physical effort 35%.

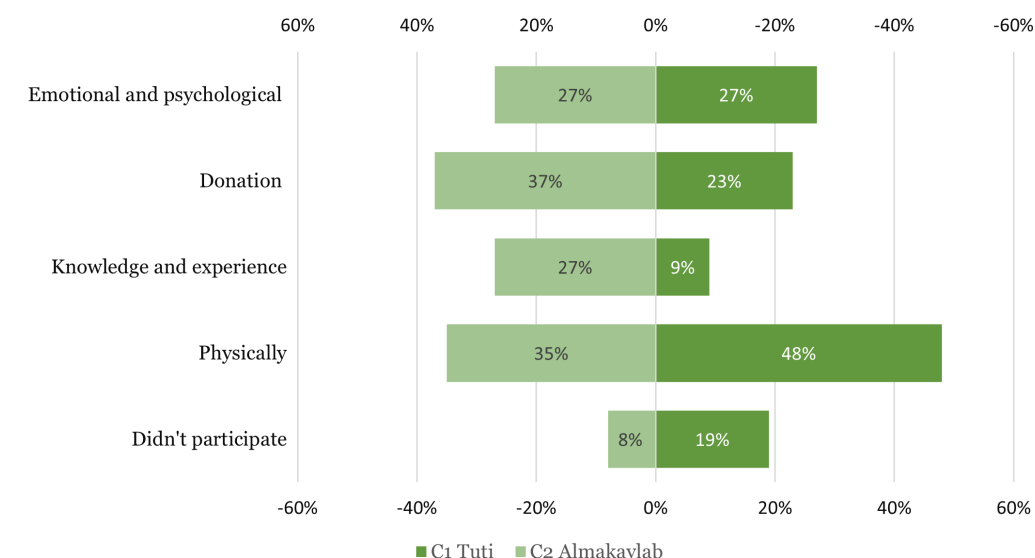


Figure 17- Types of Collective work during flood  
Source: Author.

In the Sudanese context, nafeer is “a term used both for various forms of collective actions and mutual work parties, in farming and other social projects” (Felci and Altom, 2022). Although Nafeer was confirmed to be practiced in both case studies by the questionnaire; 80% in Tuti and 79% in Almakaylab, Although the percentage is the almost same, the significance of it was more obvious in Almakaylab interviews.

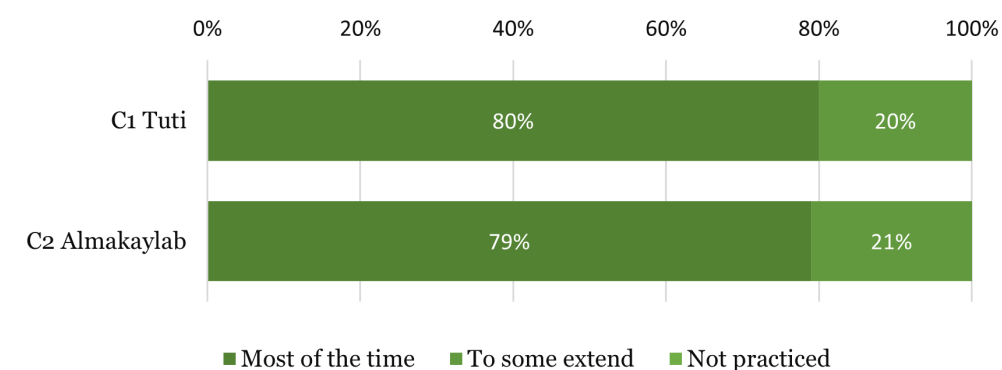


Figure 18- Nafeer  
Source: Author.





Figure 19- Group of people doing Nafeer in Almakaylab  
Source: Author

Social Trust



Figure 20- Social Trust Attribute  
Source: Author.

Social Trust was investigated in the interviews, with its three components of social events, social and blood ties, social cohesion, and heritage, the two latter appeared to be the most significant from the number of times the interviewees spoke about them.

Regarding social cohesion, people in both case studies spoke about the relationships between the community members and how they used to check, visit, and help each other even before the flood. The questionnaires supported that with Almakaylab scoring slightly higher on people thinking the social cohesion is very high 70%, compared to 62% in Almakaylab.

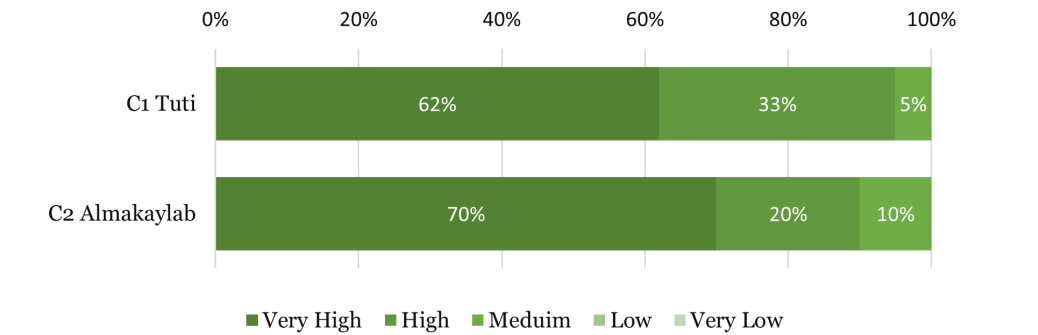


Figure 21- Social Cohesion  
Source: Author.



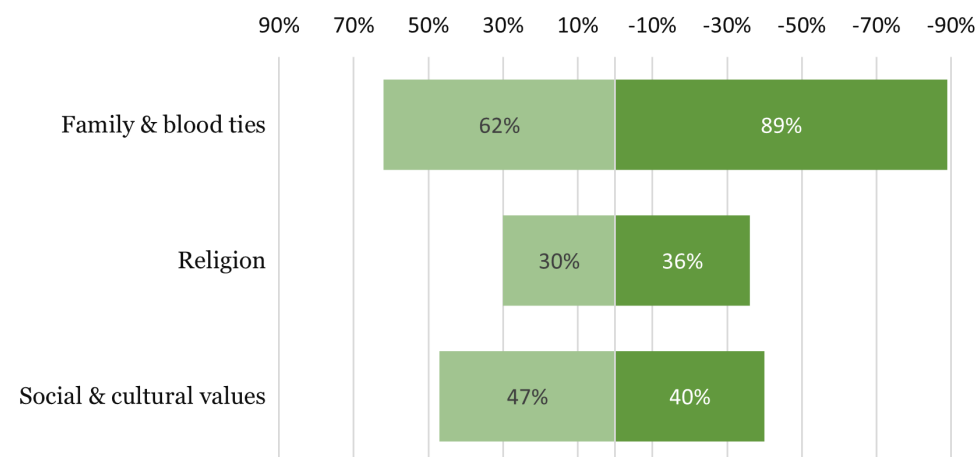


Figure 22- Factors of Social Cohesion  
Source: Author.

On the other hand, the factors behind social cohesion varied slightly, while the majority in Tuti 89% think that family and blood relations are the main reason, and the higher percentage in Almakaylab 62% also think that the main reason the social cohesion. Religion scored the lowest percentage in both case studies as a factor for social cohesion.

The role of heritage was strongly manifested in both case studies, more distinctly in Tuti, where people talked about the intangible heritage of their ancestors, their resistance to colonization, and their epic strife against the river flood, their resistance to the flood over the past decades became part of their heritage, a song was written about the flood in the past and now it is being played in the gatherings, Mr. Mujtaba says "in the flood of this year, people in the Tayas played the song "we are proud of them" through loudspeakers while they were working because it gives them enthusiasm. There are many songs and poems that are improvised at the moment of work, but they are not recorded or documented". The linkages of heritage were mostly to place attachment, previous experience, local knowledge, and organization.

In Almakaylab the role of heritage was also unmistakable, where people talked mostly about their attachment to Almakaylab, the values and manners they inherited, and also stories of previous floods, there was mentioning of some old poems about the previous floods but they were not documented, interestingly there was a local poet who wrote a poem describing the flood and the damage it caused, she says :

يا السيل فينا ما قصرت.... يا الثلت البلد بالخرطه .... السيل جانا بي اولاد موسى ... اصبحت البلد مهروسه....  
والليلة الخيم مرصوصه

Which is translated to: " Oh flood you didn't save any effort to destroy us, You erased the map of our village, water came from sons of Musa direction, turned houses into rubble, and today the tents are lining up", the poem/song is now



Figure 23- The poet performing her song about the flood in a social gathering  
Source: Author.

Social ties and blood ties were playing an important role in forming the social cohesion as displayed in the graphs above, in Tuti the majority come from the Mahas tribe while in Almakaylab the majority are Almerafab, yet in the interviews participants confirm that there are other tribes who also live both in Tuti and in Almakaylab, and they commented that the cohesion and relationship between them are v

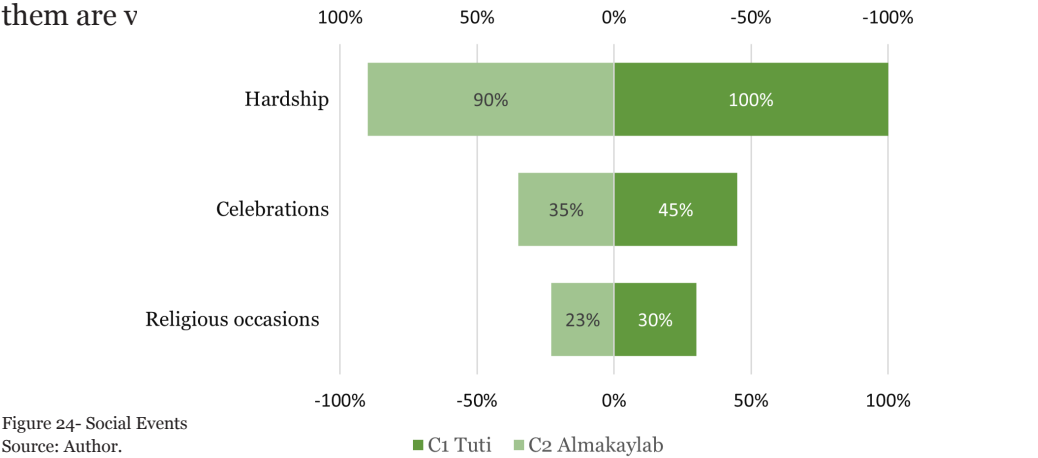


Figure 24- Social Events  
Source: Author.

In the interviews, participants from both Tuti and Almakaylab that people gather in social events, happy and sad ones alike, with more participation in the hardships like funerals, the questionnaires confirmed that the participation is much higher in hardships followed by celebrations like weddings and least was the religious occasions.

### Social Capital

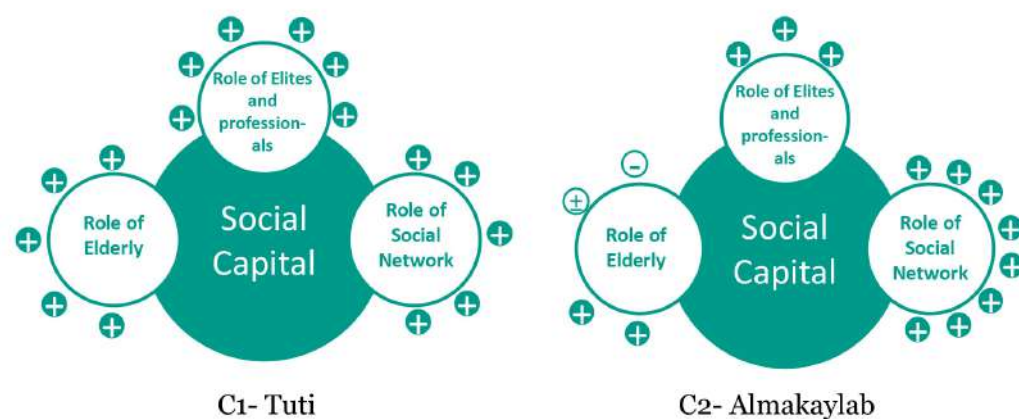


Figure 25- Social Capital Attribute  
Source: Author.

Social Capital played an important role in both case studies with variations in the significance of each of its components, for example, Tuti had a higher role of elites and professionals, while Almakaylab had a higher role of the social network. The Support from the social network in Tuti in the interviews was mostly about community support to each other in the normal situation and during the flood time in the form of money and material donations, and collective work of building the barricades, while in Almakaylab it was mostly about response actions in the flood time, food donations from the surrounding villages, and money and material donations from family and relatives. The questionnaires confirm that the role of social network is higher in Almakaylab than in Tuti.

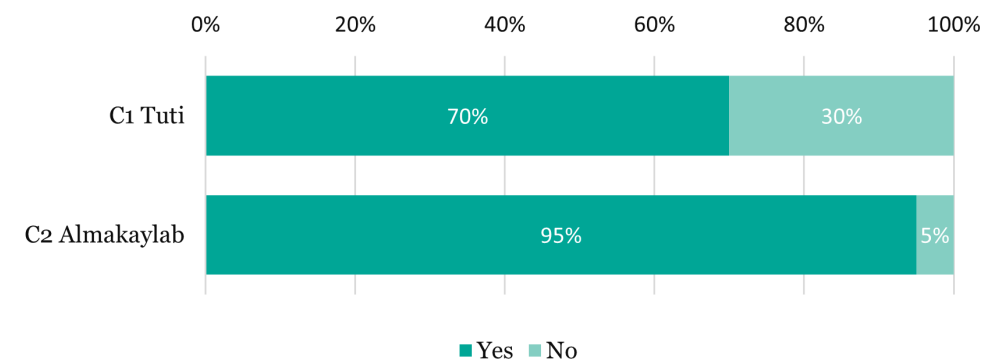


Figure 26- Support from Social Network  
Source: Author.

The questionnaires also show that the highest support received from the social network was the physical effort that the community did collaboratively to protect each other, while in Almakaylab it was the money and material donations they received from family and relatives as a response help.

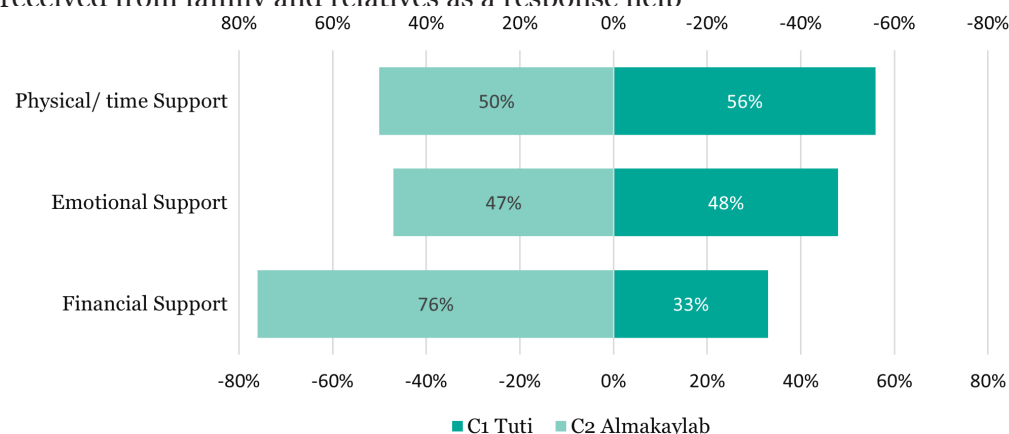


Figure 27- Type of Support from Social Network  
Source: Author.

The role of elites was evident in both case studies, although it was clearer and more significant in the interviews of Tuti, the questionnaire shows a close percentage of the importance of their role with a slightly higher percentage in Almakaylab 73% compared to 70% in Tuti.

The interviews revealed that Tutians have a high percentage of professionals and individuals working in public service, they also divide the tasks in the time of flood according to the professions and who would know better. In Almakaylab, it was more about the wealthy members of the society made donations, and the role of Makaylabi people in Khartoum and outside Sudan with their different

professions; Mr. Faisal says, “The sons of Almakylab outside Sudan played an important role in giving and collecting donations, the sons in Khartoum formed an operation chamber, they also played a crucial role in the media and the donations”.

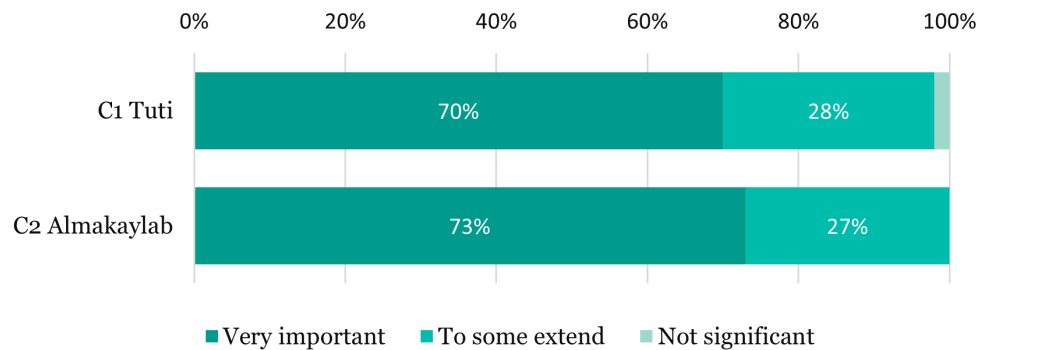


Figure 28- Role of Elites and Professionals  
Source: Author.

The role of the elderlies in both case studies was mostly about providing knowledge and guidance due to their previous experience with the flood, their role in leadership, and resolving conflicts in non-flood time. Yet in Almakaylae rescuing old people was a difficulty, especially the disabled ones, but people collaborated to curry and rescue them. The questionnaire revealed that the role of elderlies in providing knowledge and experience is significantly higher in Tuti 95% compared to Almakaylab 67%.

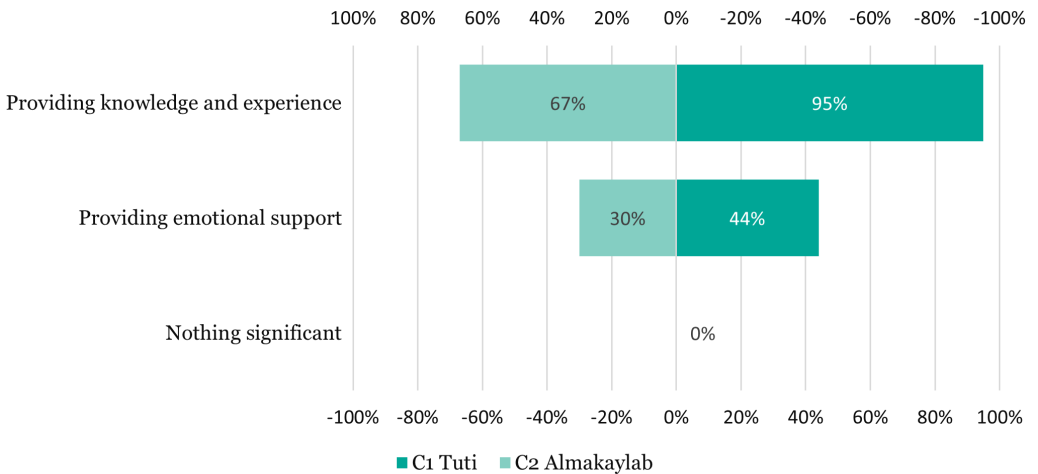


Figure 29- Role of the Elderlies  
Source: Author.

Social Capital

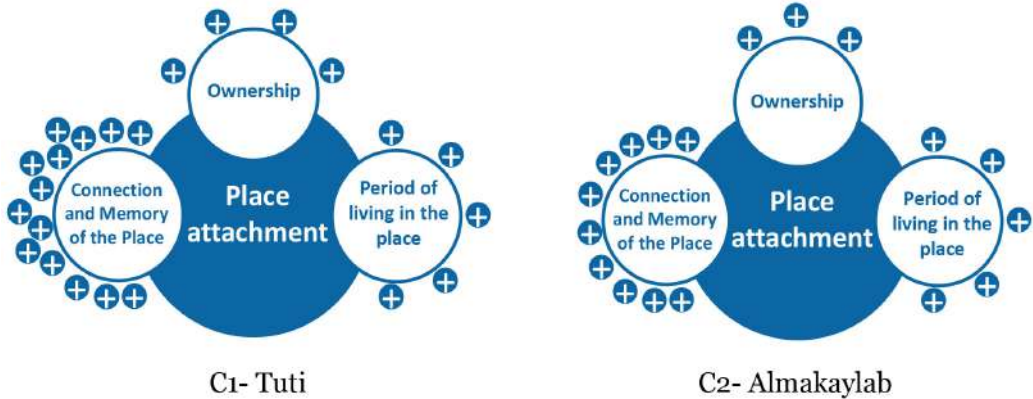


Figure 30- Place Attachment Attribute  
Source: Author.

Place attachment was examined through three aspects, Period of living in the place, ownership, and connection and memory of the place. All the interviewees from both case studies were local people who were born and raised in the place, questionnaires on the other side were open to all people living in Tui and Alamakylab whether they are originally from there or just living there. In Almakaylab 95% of the respondents were born and raised there, compared to 87% in Tuti. which is a high percentage for an area in the middle of the capital.

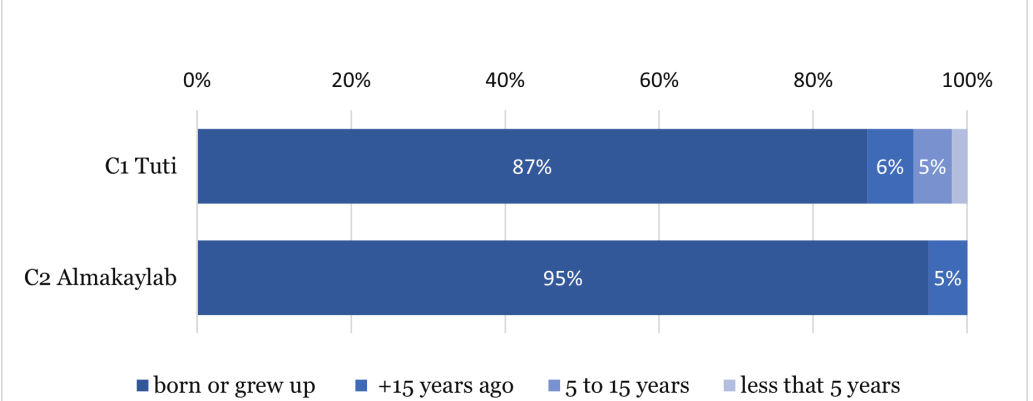


Figure 31- Period of Living in the place  
Source: Author.

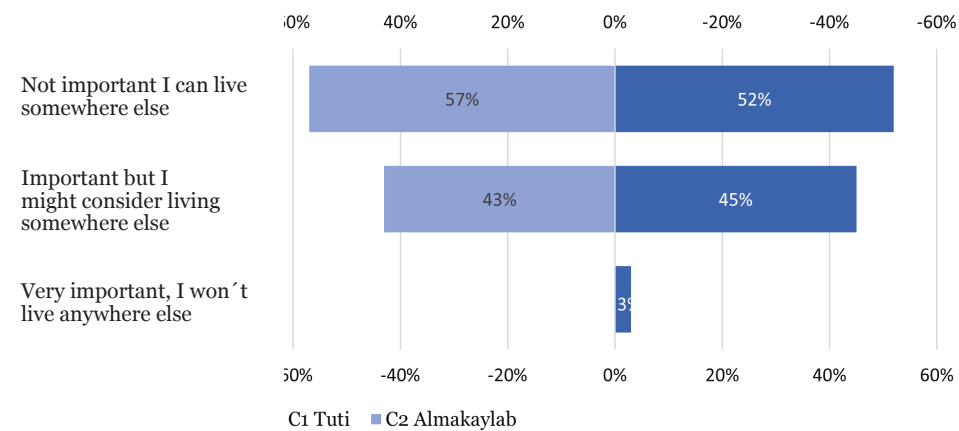


Figure 32- Importance of living in the place  
Source: Author.

The sense of ownership in Tuti was related to their previous fight against the colonizers and the state, Mr. Mohamed says “In 1946 we have fought the colonizers with our fight against the flood, we thought they are the reason behind it because they wanted to take our land”.

In Almakaylab the sense of ownership was represented in the high level of land ownership since everyone is living in their own house and nobody rents a house, also it represented in their refusal of the offer of the state and NGO to move to another land after the flood, Hanadi says “the best solution is to leave the area to the model village in the east, the government, and the organizations affirmed the people that the flood won't come there, but the people refused to leave their area, they didn't trust that flood will not come there, and they didn't want to go far from their agricultural land and the Nile”. That was also confirmed by the questionnaires, while almost half of the participants from both case studies said they would not live anywhere else, this percentage dropped to 28% in Tuti when we asked would you move out if the flood comes more frequently, while it dropped to 42% in Almakaylab.

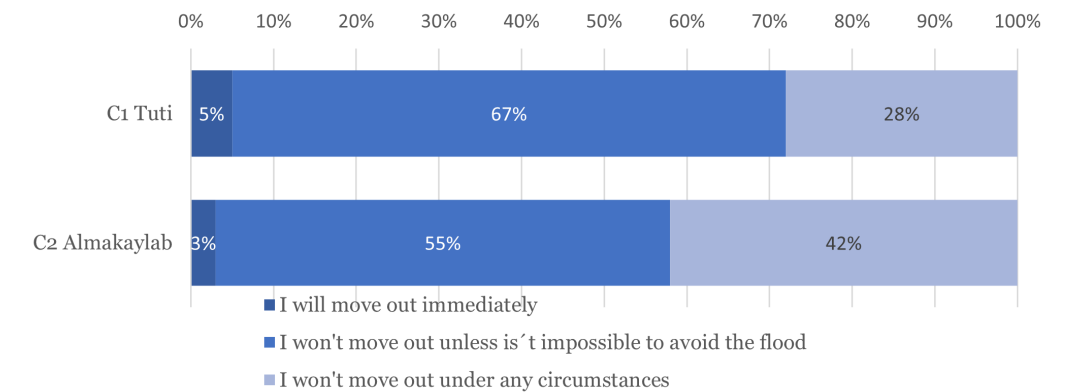


Figure 33- Possibility of Moving  
Source: Author.

In both case studies, the place memory of the place was mostly about the previous experience with the flood, like where the flood comes from, where the tayas were located, how the urban fabric used to look like, and the local names of the areas or nodes that usually only locals know, Mr. Mohamed from Tuti says “The area of the island is about 350 acres and has a long shore surrounded by water, at that time in 1946 the island was surrounded by agricultural lands, and the residential area was located in the middle. The flood crossed the entire agricultural area and reached the borders of the residential area”, while Tahani from Almakaylab says “The flood of 1988 did not reach this area of our homes. Last year was the first time that the flood reached us. We also heard of the 1946 flood, which our ancestors lived through, but this area was not inhabited at that time, so not many were affected”.

The questionnaires explored the meaning of the place to the participants, the results were close in both case studies, with Identity and pride coming first, followed by Family, then friends, and lastly memories.

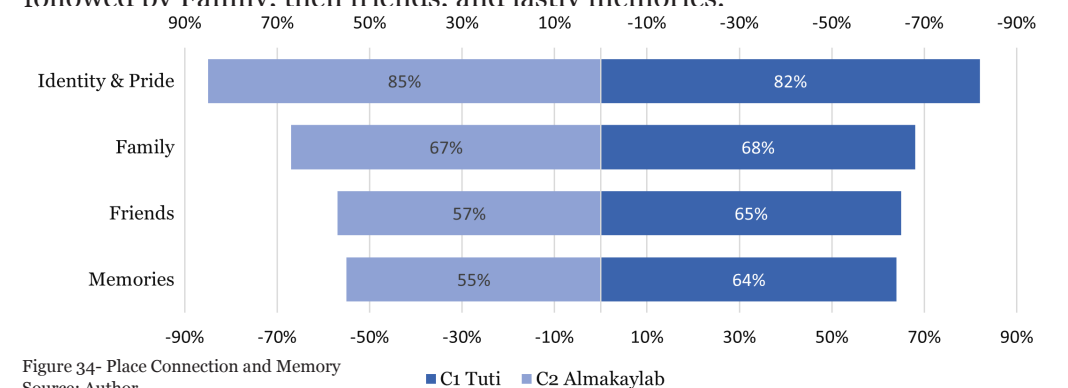


Figure 34- Place Connection and Memory  
Source: Author.



## Leadership

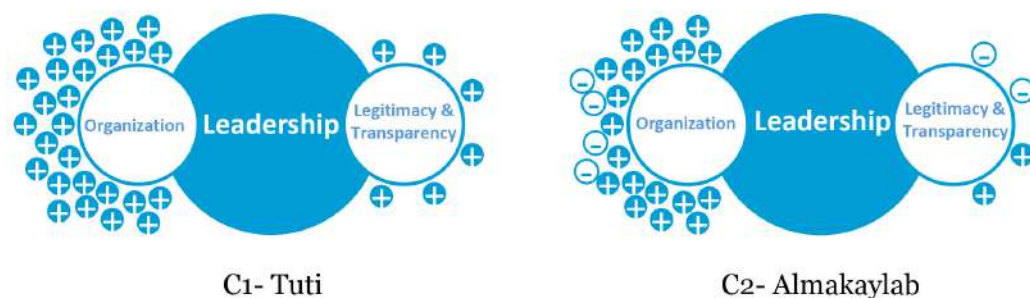


Figure 35- Leadership Attribute  
Source: Author.

Leadership was represented through two components, organization, and legitimacy and transparency, Organization appeared to be the most significant in both case studies.

As an attempt to understand how the system of leadership works in a normal non-flood situation, the questionnaire asks the participants how people solve their local conflicts? in both case studies the majority said through local leaders like the elderlies and the mayors, followed by religious leaders and the lowest was through the legal system.

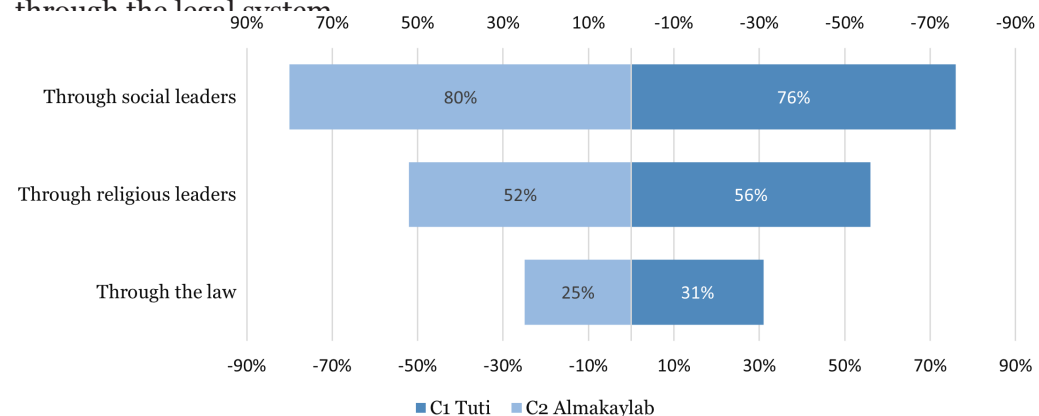


Figure 36- Local Conflict Resolution  
Source: Author.

The organization in Tuti was mostly about how the community organizes and mobilizes itself preparing and protecting the island from the flood, with a unique system of Tayas they prepare for the flood, monitor the river, and respond when there is a leakage of flood water to the island, so it was mostly related to collective action, preparedness, and local knowledge.

On the other hand, organization in Almakaylab was more about the collective actions in the response phase after the flood came, how they managed to build on the local committees they already have and organize themselves to attract donations and grab international attention to their situation.

A main difference was the legitimacy and transparency, while tutians were obviously paying attention to consulting the community on the leaders, and also updating them on what is happening regarding the preparation, Makaylabi on the other side depended on people volunteering to work in the flood committees \_which was needed in the flood time\_ they then had internal division related to transparency in the adaptation/ reconstruction phase that led to the solution of the committee and formation of a new one.

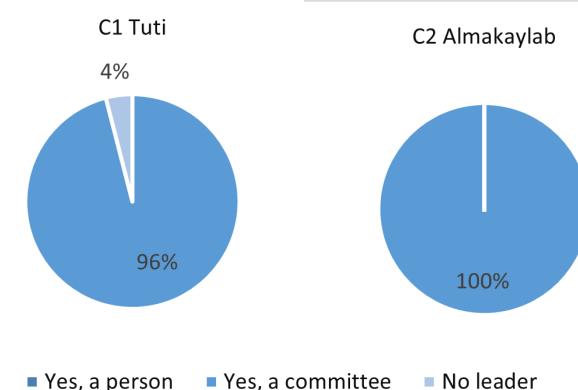


Figure 37- Leadership in Flood time  
Source: Author.

In the questionnaire, we asked if the participants knew about the leaders in the flood time, the majority in both case studies were aware of the flood committees, only a few in Tuti's case didn't know. Moreover, we asked what the characteristics should be in the leaders against flood, in Tuti the most two important characteristics were to be socially trustable and knowledgeable, followed by being from the older generations, and then lastly being religiously trustable. In Almakaylab the most important was being socially trustable, then knowledgeable, followed by religiously trustable, and lastly being from the older generation, noticeably the importance of being knowledgeable was not as important for Makaylabi as it is for Tutians.



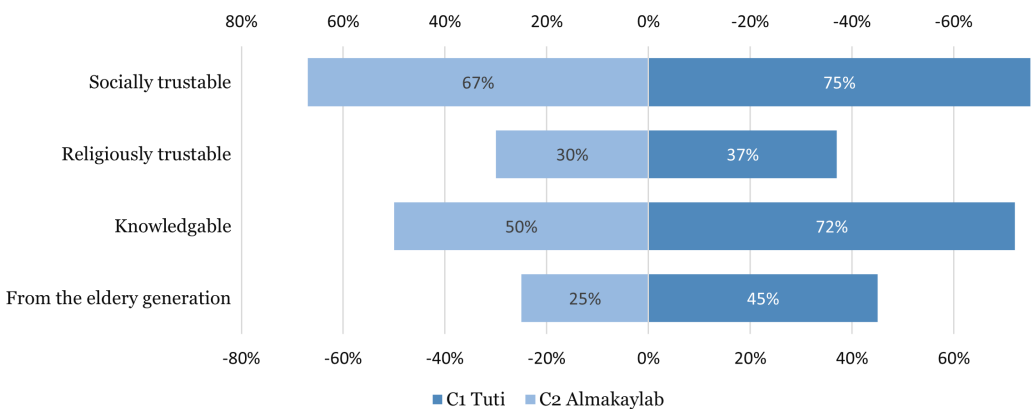


Figure 38- Leaders Characteristics  
Source: Author.

The questionnaires also confirmed that Tutians elected their leaders, 60% agree, while Makaylabis depended on who volunteered to work on the committees, and 60% agreed. Although it wasn't a totally organized election but more of a nomination and then the majority agreeing verbally, it gives an idea of the democratic principle behind it, and also in Almakaylab if someone volunteers and he is known for a bad act then he wouldn't be accented.

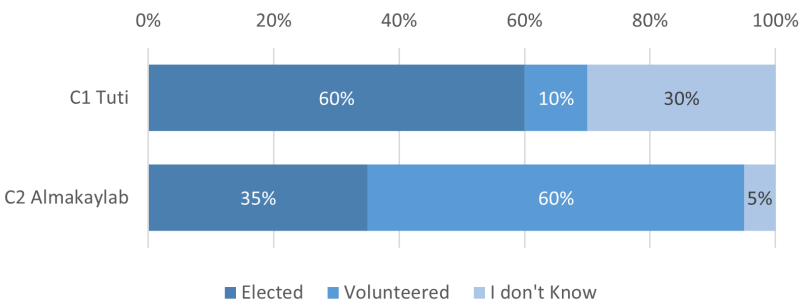


Figure 39- Choosing the Leader  
Source: Author.

Preparedness

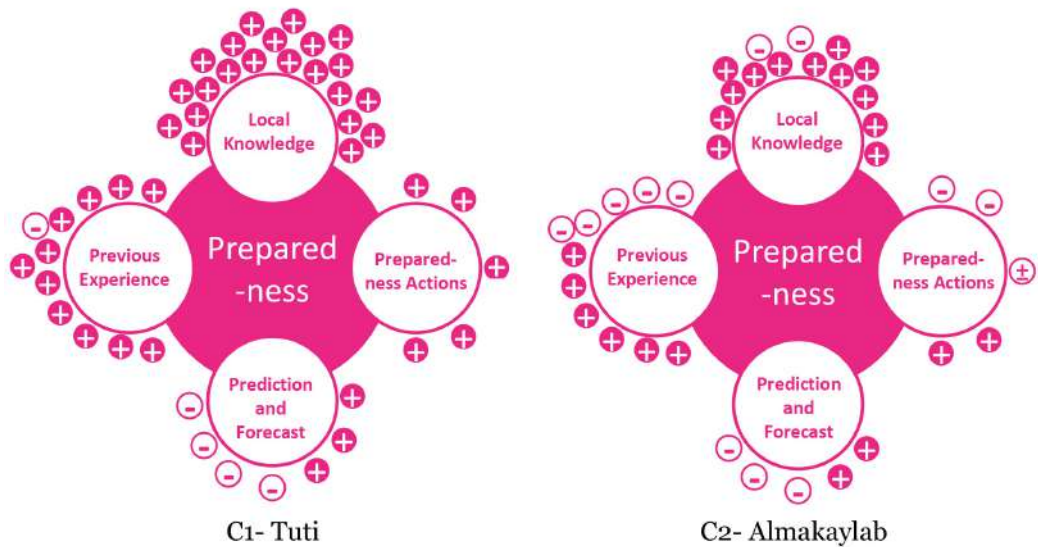


Figure 40- Preparedness Attribute  
Source: Author.

Preparedness has been examined through four components, Prediction and forecast, preparedness actions, local knowledge, and previous experience, the results varied vastly between the two case studies, due to the nature of the flood itself and also the local knowledge that was significantly higher in Tuti than Almakaylab.

Although both case studies expect flood every year, Tutians are aware of the severity of the Nile flood, so they do their preparations quite early, in the other hand Makaylabi people are used to a flash flood that comes every year through a certain creek and rarely fills the creek to cause a flood. The questionnaires confirm the difference in the nature of the flood where tutians expect the flood before a month 40% or a week 29% by monitoring the river, but 57% of Makaylabi people said that they can only know about the flood within a few hours before it comes.

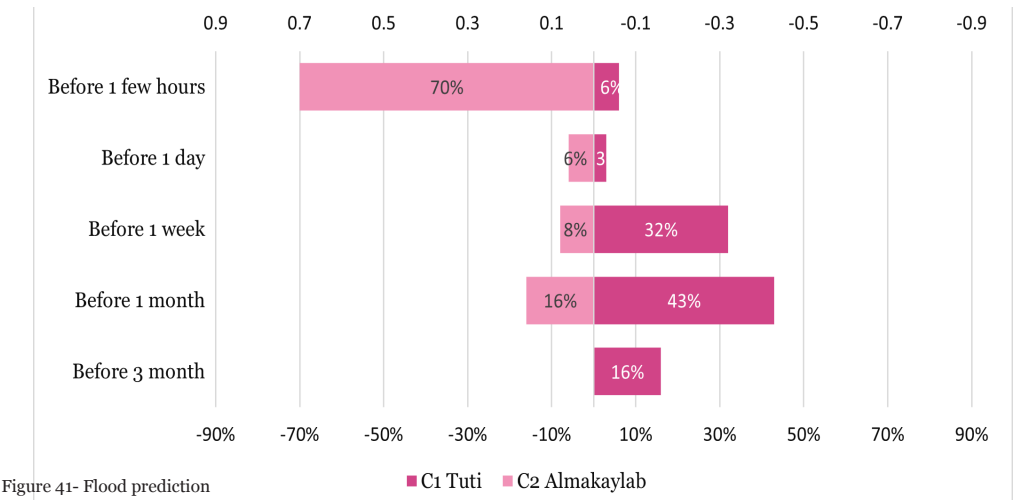


Figure 41- Flood prediction  
Source: Author.

Tutians put a significant effort into preparing for the flood, and start preparing for it quite early, the greater percentage in Tuti says that the preparation starts 3 months before the flood, while in Almakaylab they say that they start before one month. The interviews showed that there were some preparations done by the people and the municipality, but it wasn't done properly, and when people knew that the flood is coming a few hours they started to level up the edges of the creek,

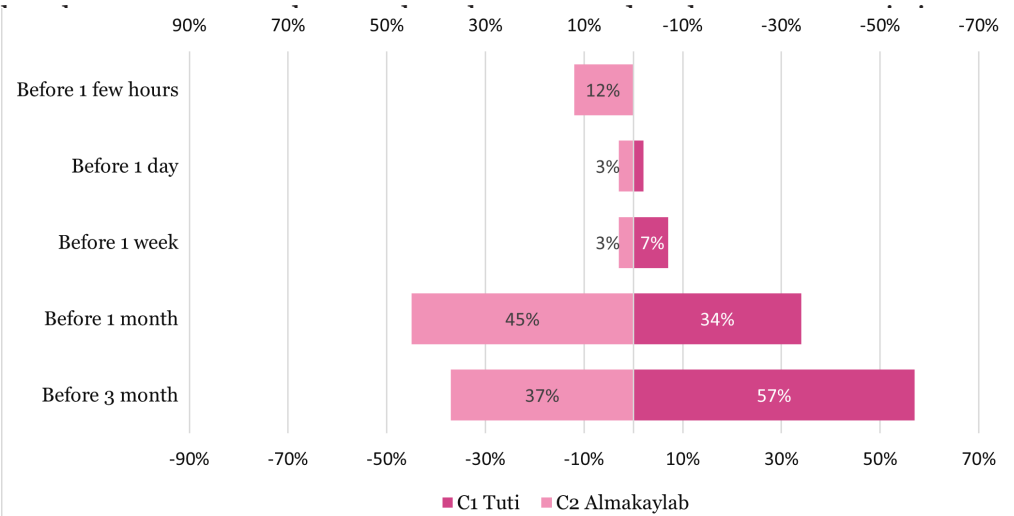


Figure 42- Start of preparedness Actions  
Source: Author.

As mentioned in the interviews and confirmed by the questionnaires, the nature of these preparedness actions in Tuti was: building the barricades 95%, preparing equipment and materials 75%, and collecting donations 34%, while in Almakaylab were: cleaning and opening the creeks 75%, building barricades 62%, and lastly

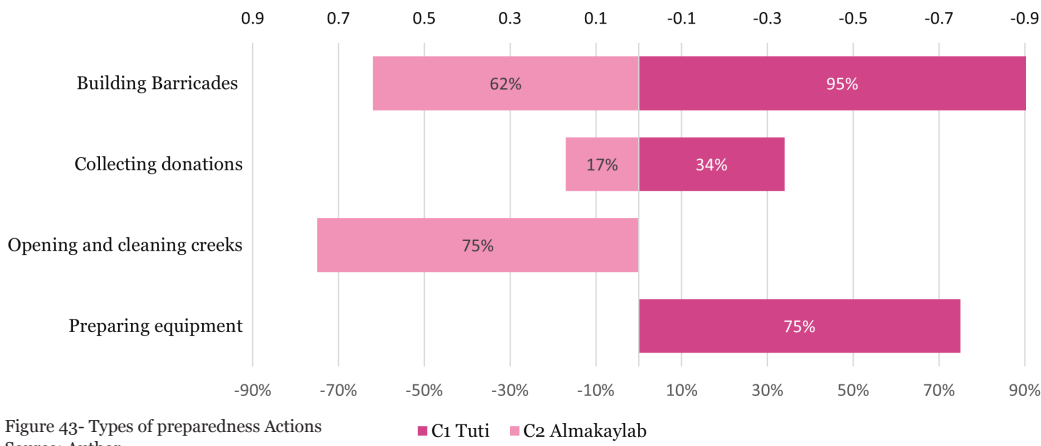


Figure 43- Types of preparedness Actions  
Source: Author.

We also investigated the building resistance and building materials in both case studies to get an idea about the physical and built environment, 37% of Tutians reported their houses as with high resistance, and 56% reported as having medium resistance, while in Almakaylab only 2% reported their houses with high resistance, and 70% reported as medium resistance, that goes partially with the building typologies, as we find in Tuti the majority of houses built from red bricks that are known to have medium resistance, but in Almakaylab 50% of the houses made of mud bricks which are known to have a low resistance to water but some of the mud brick houses resisted better than other red brick houses due to other factors

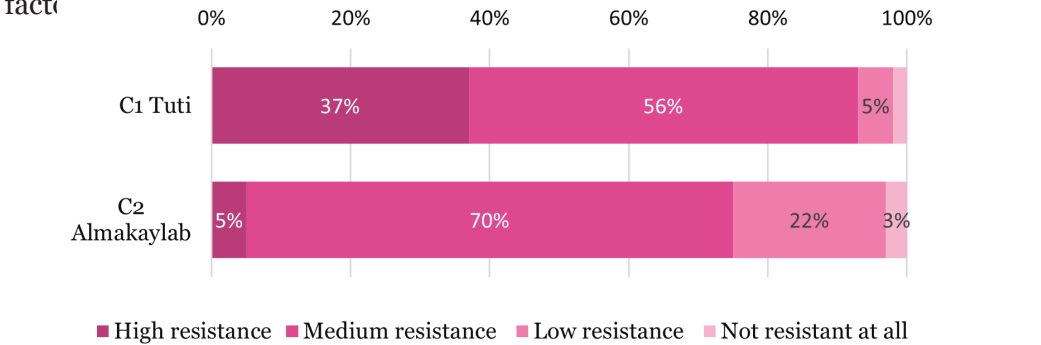


Figure 44- Buildings Resistance  
Source: Author.

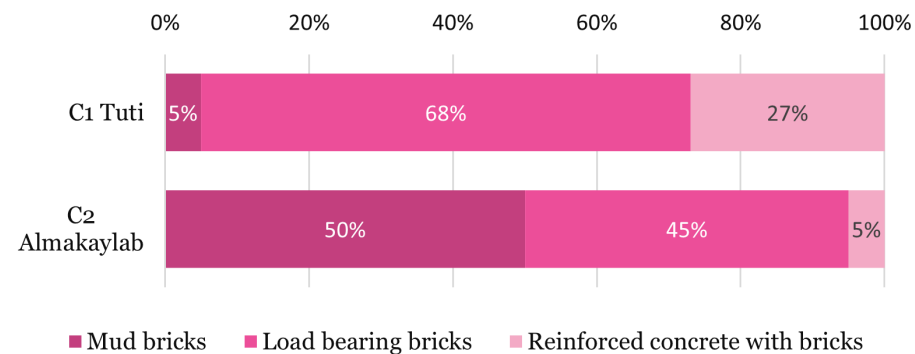


Figure 45- Building Typologies  
Source: Author.

Previous experience played an important role in the resilience of Tutians, with the repeated yearly flood of the river tutians became used to and familiar with the flood, Mr. Hafiz says “In 1998 there was another flood, but the people were well prepared for it, and the young people were well trained from the flood in 1988”. In Almakaylab they also witnessed two previous floods, but they were not as severe as the one of 2022 that destroyed the village.

The questionnaire also shows the difference between the previous experience in the two case studies, although the majority in both case studies witnessed 1 to 3 previous floods, only 5% in Tuti didn’t witness any previous flood compared to 35% in Almakaylab, also 29% witnessed more than 4 floods in Tuti compared to 8% in Almakaylab.

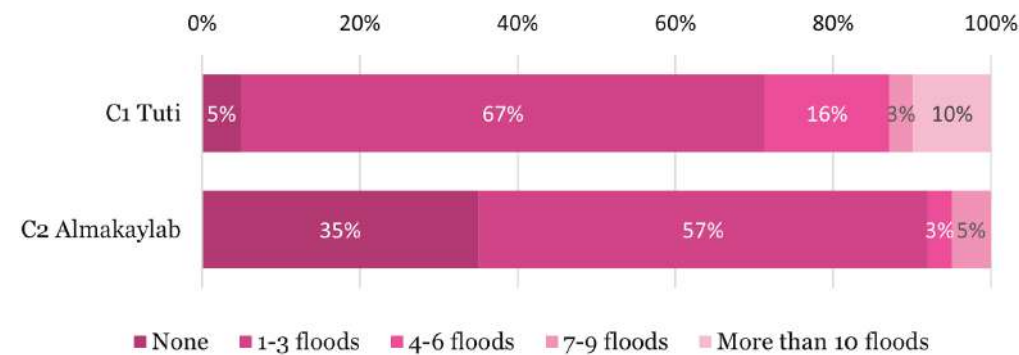


Figure 46-Previous Experience  
Source: Author.



Figure 47- Building the barrier with sand sacks- Tuti 1988.  
Source: Mr. Hafiz Mohamed.

Both Tutians and Makaylabi people have significant knowledge about their area and its nature, moreover, tutians developed their own local knowledge of building barriers, Mr. Mujtaba says “In 1988 the human barrier was also formed, as it was a technique that people learned from their parents from the 1946 flood and is still continuing until now and was used in the flood of this year also 2020, these are techniques that Tuti sons inherited from generation after generation”. In Almakaylab the local knowledge about the weather, the creeks, and the land topography was also evident, Mr. Mohamed says “Usually when it rains heavily, we expect the flash flood to come through the creeks a couple of hours later, especially the rain that come in the morning, but the last flood was not expected to come in this amount”



Figure 48- Tutians using the human barrier technique.  
Source: (Felci et al., 2020)



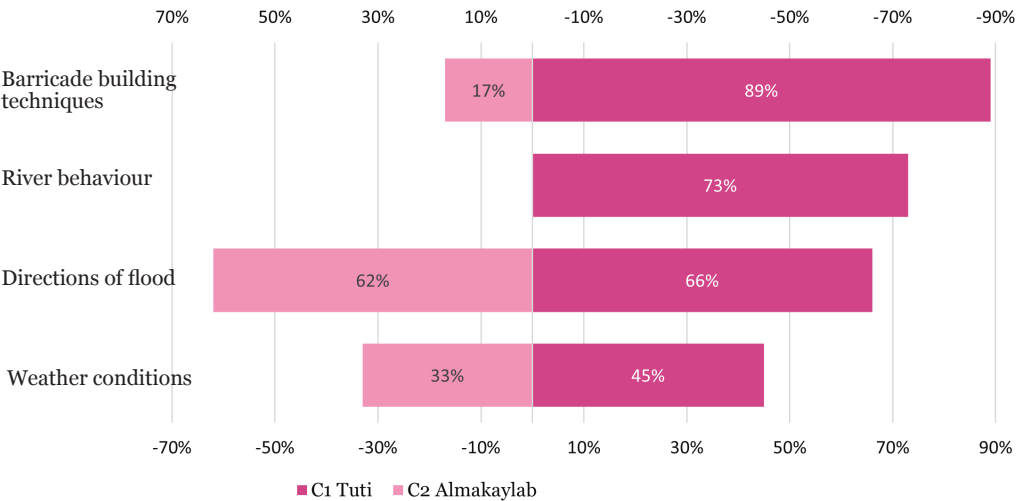


Figure 49- Local Knowledge  
Source: Author.

Previous experience played an important role in the resilience of Tutians, with the repeated yearly flood of the river tutians became used to and familiar with the flood, Mr. Hafiz says “In 1998 there was another flood, but the people were well prepared for it, and the young people were well trained from the flood in 1988”. In Almakaylab they also witnessed two previous floods, but they were not as severe as the one of 2022 that destroyed the village.

The questionnaire also shows the difference between the previous experience in the two case studies, although the majority in both case studies witnessed 1 to 3 previous floods, only 4% in Tuti didn’t witness any previous flood compared to 37% in Almakaylab, also 24% witnessed more than 4 floods in Tuti compared to 2% in Almakaylab.

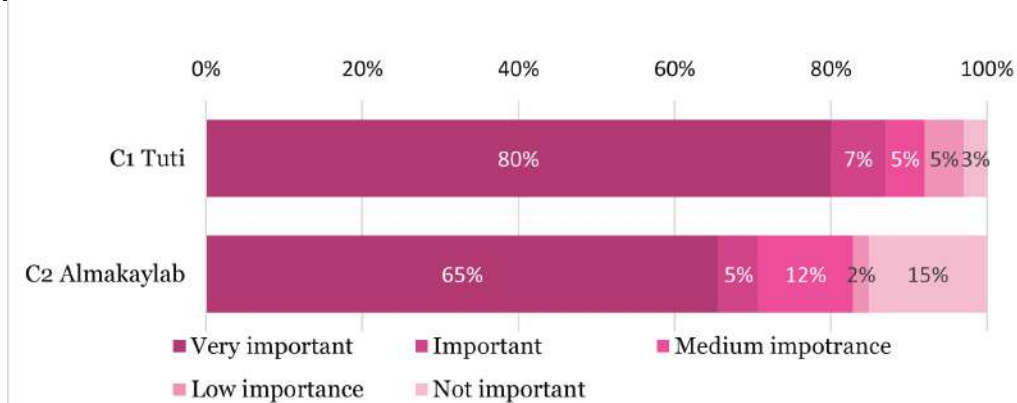


Figure 50- Importance of Local Knowledge for Flood Management  
Source: Author.

### Prenaredness

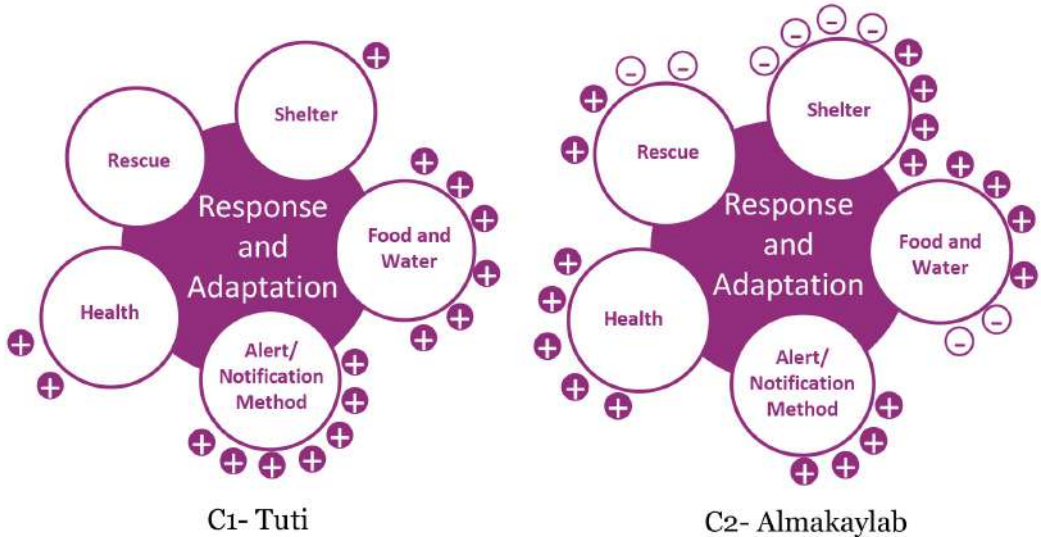


Figure 51- Response and Adaptation  
Source: Author.

From the Inductive investigation of the data, a set of response and adaptation attributes were noticed, this was not expected from the literature-extracted attributes, because they are perceived in the literature as institutional tasks, however, they were an important part of the community resilience as well.

Response and adaptation have many components, they are shelter, rescue, food and water, health, and Alert/ Notification method. Given the fact that the flood in Tuti always remained a hazard and never turned into a disaster, the response and adaptation part is found to be way less than it is in Almakaylab. The rescue was never needed in Tuti compared to Almakaylab where people had to rescue their lives first by going to a higher spot and then later rescuing what could be rescued from furniture and appliances. The shelter was rarely needed in Tuti, only when a few houses were affected and they had to accommodate some families in the local school, while in Almakaylab shelter a big challenge, people lost their houses entirely or partially and had to stay out of them for at least a week, Najat says “After about 12 days, some people were able to return to their homes, which were not completely destroyed, and the rest remained in the camps, It took about a month for all the water to dry up, and some people stayed until two or three months, extracting their furniture, which was covered in mud inside the houses, and many of them were damaged”. In Almakaylab the linkages were obvious to

the role of NGOs that provided donations to the most vulnerable to rebuild their homes, also linkages to the social capital of family and friends donating money for the rebuild as well, also the role of the community itself doing Nafeer. Despite the big efforts made for shelter and donations, there are still many without homes, especially since rebuilding takes time.

Regarding food and water, in Tuti most of the food is prepared in tayas during the flood time, Mohamed says “There are also Tayas for women and they make food. Nobody brings food from their home, all the food is made by women in these Tayas”, it is clearly related to the role of women and the organizational aspects within the community. In Almakaylab there was a shortage of food and drinking water, it was mostly supplied by the neighboring villages, NGOs, and donors.

The only health issue in Tuti was the stagnant water after the flood recessed, this water allows mosquitoes to breed so the Taya members also pump it back into the river to avoid diseases. In Almakaylab there was a health hazard because of the flood water, some cases of malaria and diarrhea started to appear, the community leaders played a role in raising awareness of staying away from the flood water and never drinking it, then many NGOs in collaboration with the state worked on spraying pesticides and providing free medicine and consultation, one NGO stayed for 6 months after the flood providing health services.

The Alert and notification method was significant in Tuti, it helped them avoid the disaster, their main effort was towards monitoring the river and alarming the community if there is leakage or potential risk from the river so that the community member come and help collectively in the stopping the leakage, this alarming was done in the past by hitting barrels so that people can hear the sound and come, nowadays it is done through loudspeakers of the mosques and through social media like WhatsApp or Facebook groups. In almakaylab people used to know about the approaching flash flood from nomads living in the vacant land to the east of the Almakaylab, they tried to contain the water by leveling up the edges of the creek, but it was too late and too much water.

### Institutional Aspects

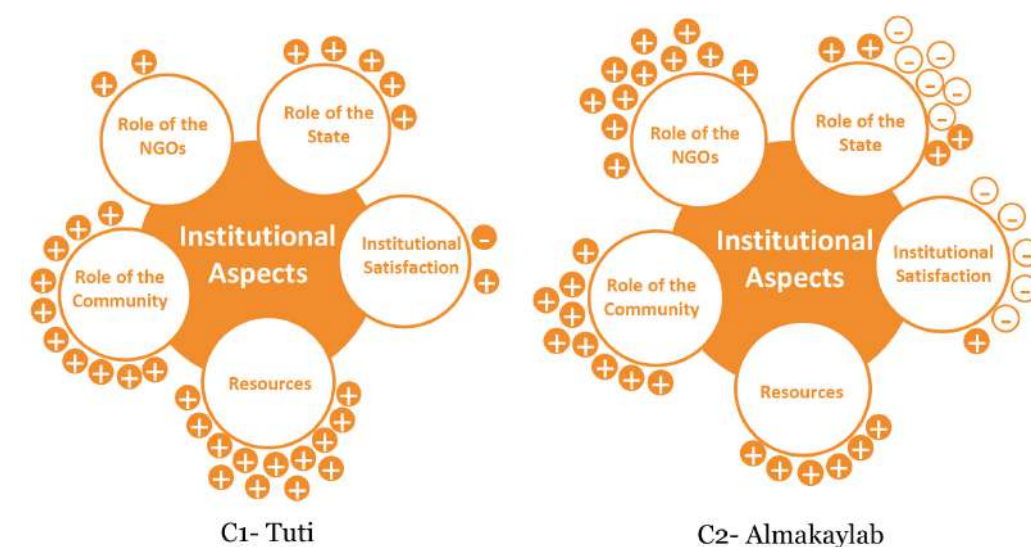


Figure 52- Institutional Aspects  
Source: Author.

The institutional aspects were explored through five themes, the role of the community, the role of the State, the role of the NGOs, resources, and institutional satisfaction, the five themes varied among the two case studies.

A general question about insurance coverage was asked to the participants from the two case studies, half of the participants in both case studies have health insurance, very few have house or work insurance, and a significant percentage over 30% don't have any type of insurance.

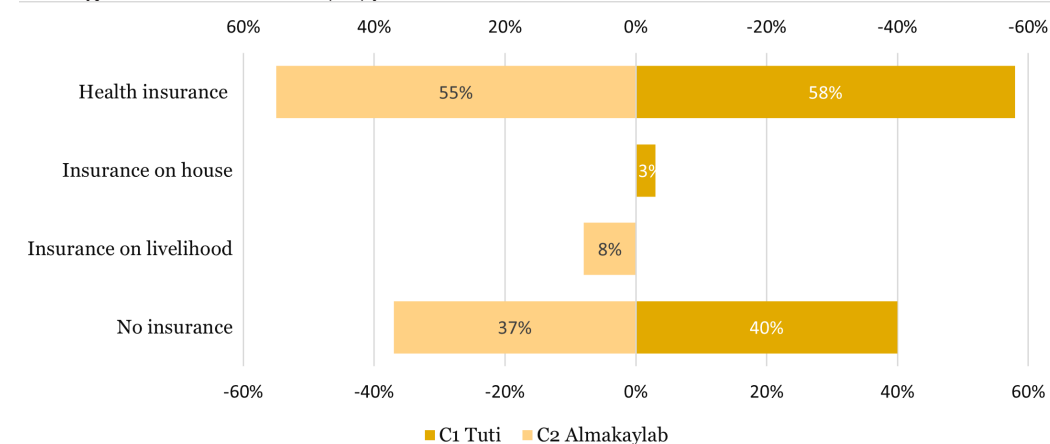


Figure 53- Insurance Coverage  
Source: Author.

In both case studies the state played an important role, in Tuti they were helping by providing sand trucks to build the barriers, also providing pumps to pump the flood water back to the river, and the reports from the metrological authority were helpful in monitoring the river. In Almakaylab the state played a significant role in providing the highest donation among the other donations, for the adaptation and reconstruction, they also helped in facilitating the work of the NGOs that provided humanitarian aid. Despite that, a significant percentage in both case studies think that the state didn't do anything at all, 42% in Tuti and 37% in Almakaylab.

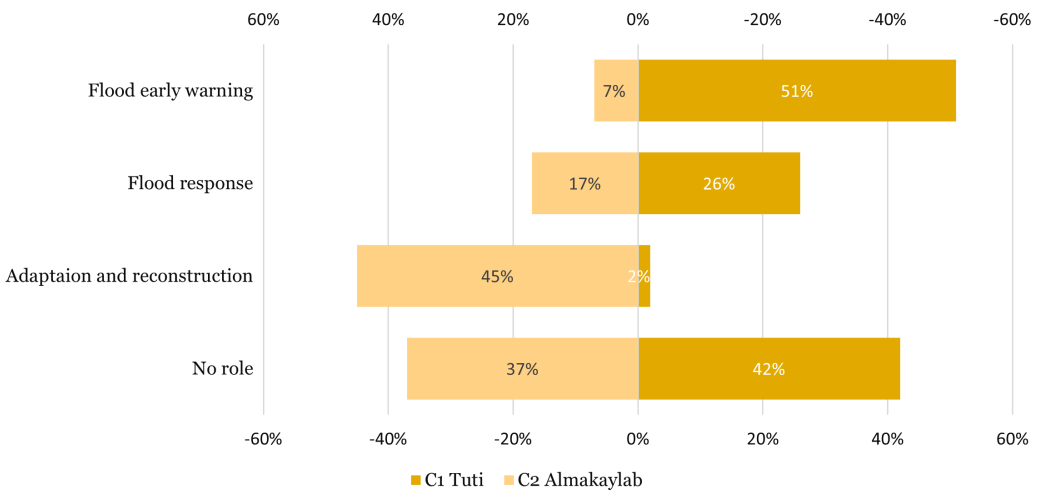


Figure 54- Role of The State  
Source: Author.

Then participants were asked to evaluate the role of the state on a scale from 1 to 5, 1 being very bad and 5 being very good, the majority in Tuti voted for 2 and 3 (weak & meduim) respectively, while the majority in Almakaylab voted for 1 (very weak).

In the interviews Tutians were mostly conservative about their opinion towards the role of the state, while in Almakaylab it was clear that the community expected more from the state, Ali says “The response of the government should have been better and faster when the flood happened, between a day and the other people lost their houses and were sleeping without a shelter surrounded by water, the government should have acted immediately to safe them, the NGOs did a lot, without them we would have been in another health disaster.

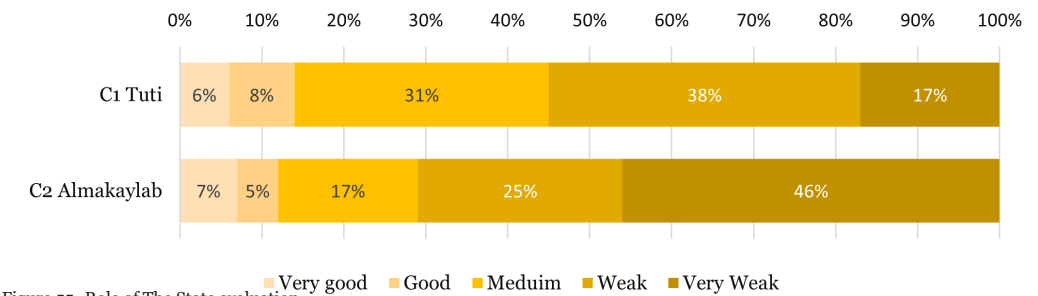


Figure 55- Role of The State evaluation  
Source: Author.

The highest role in preparedness is the community in both Tuti and Almakaylab, the lowest role is the state for Tuti, and an equally low role of the State and NGOs in Almakaylab.

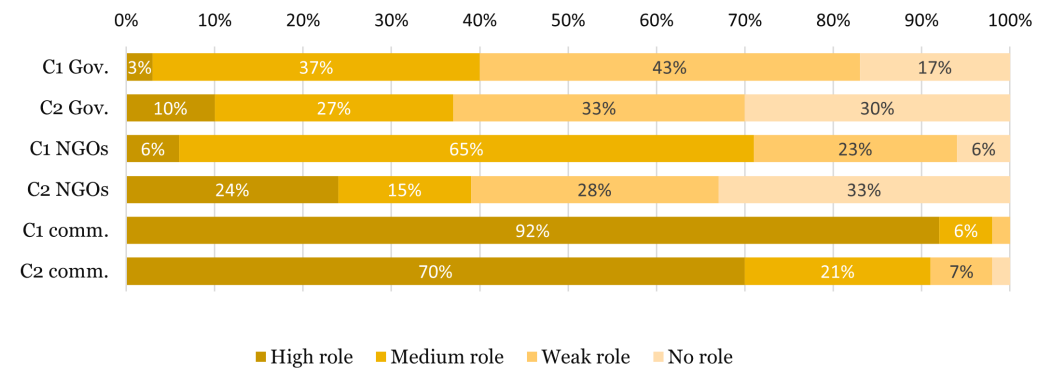


Figure 56- Roles in Preparedness  
Source: Author.

The highest role in response is the community in Tuti and shared between the community and NGOs in Almkaylab, the lowest role is the state for both case studies.

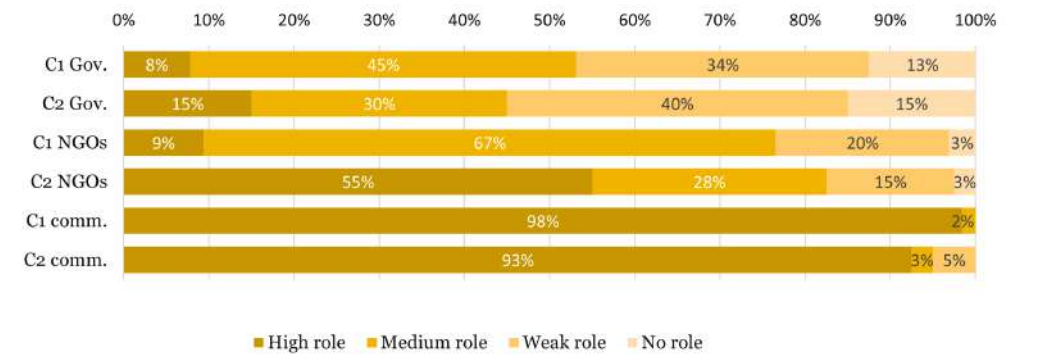


Figure 57- Roles in Response  
Source: Author.

For Tuti, the highest role in adaptation is the community, lowest was the state. In Almakaylab the highest role is divided equally between the three parties, the community, NGOs, and the state.

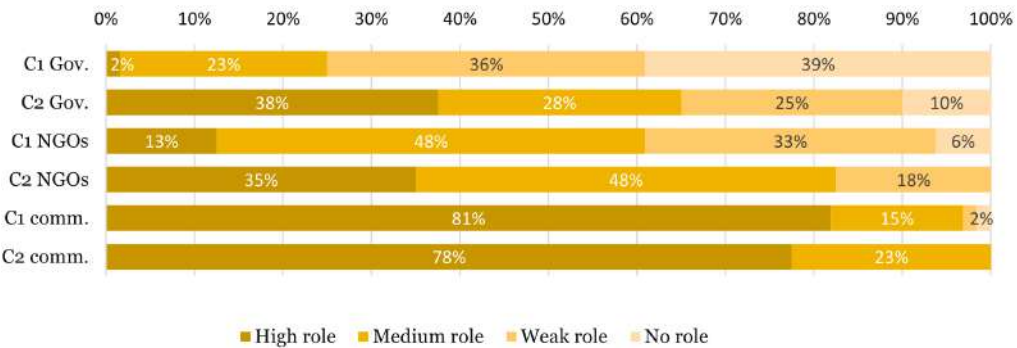


Figure 58- Roles in Adaptation  
Source: Author.

Regarding the future collaboration role, a question was asked how do you imagine the future collaboration between the community, NGOs, and the state? In Tuti 82% think that it is best to be in collaboration and agreement on roles distribution compared to 58% in Almakaylab, and only 19% think that the state should take responsibility for everything regarding the flood compared to 32% in Almakaylab.

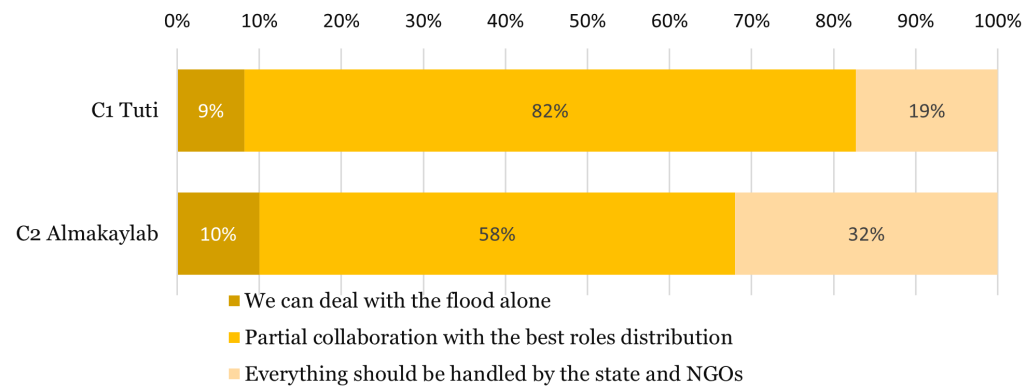


Figure 59- Fututre collaboration possibilities  
Source: Author.

Regarding the future roles in preparedness, both tutians and Makaylabi expect the state to take the major role while the community takes a medium role, and the NGOs take a low to medium role.

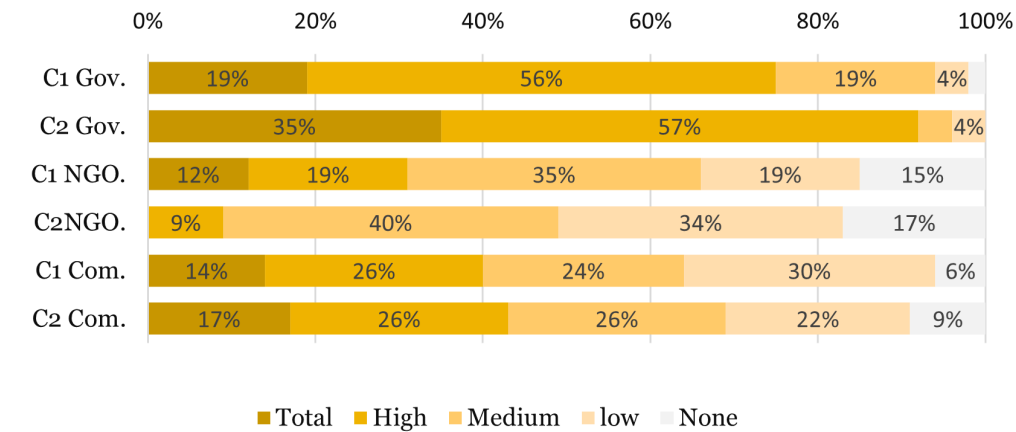


Figure 60- Future Roles in preparedness  
Source: Author.

In the future roles in response, both tutians and Makaylabi expect the state to take the majority of the roles while the community takes a low role, and the NGOs take a medium role

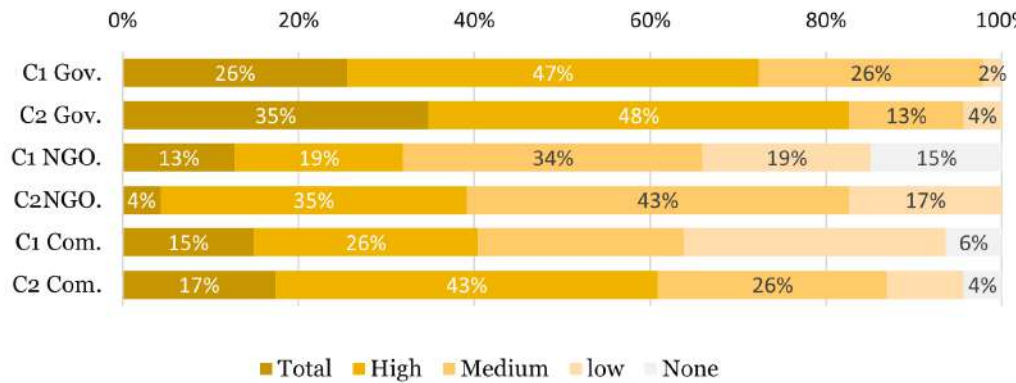


Figure 61- Future Roles in Response  
Source: Author.

For the future roles in adaptation, both tutians and Makaylabi expect the state to take the majority of the roles while the community takes a low role, and the NGOs take a medium role

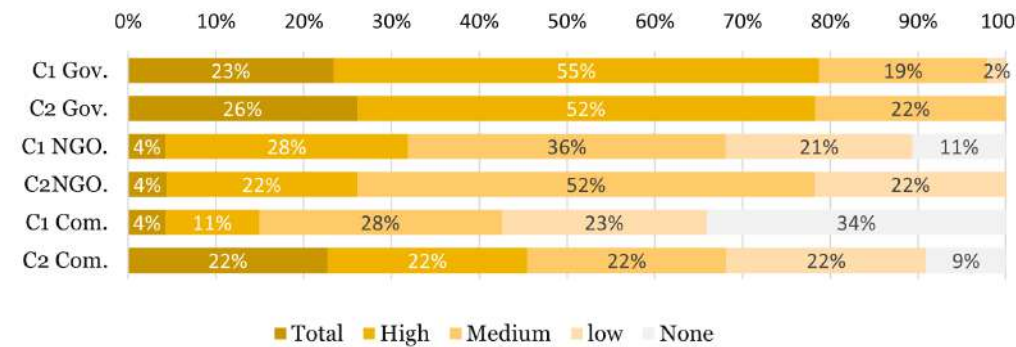
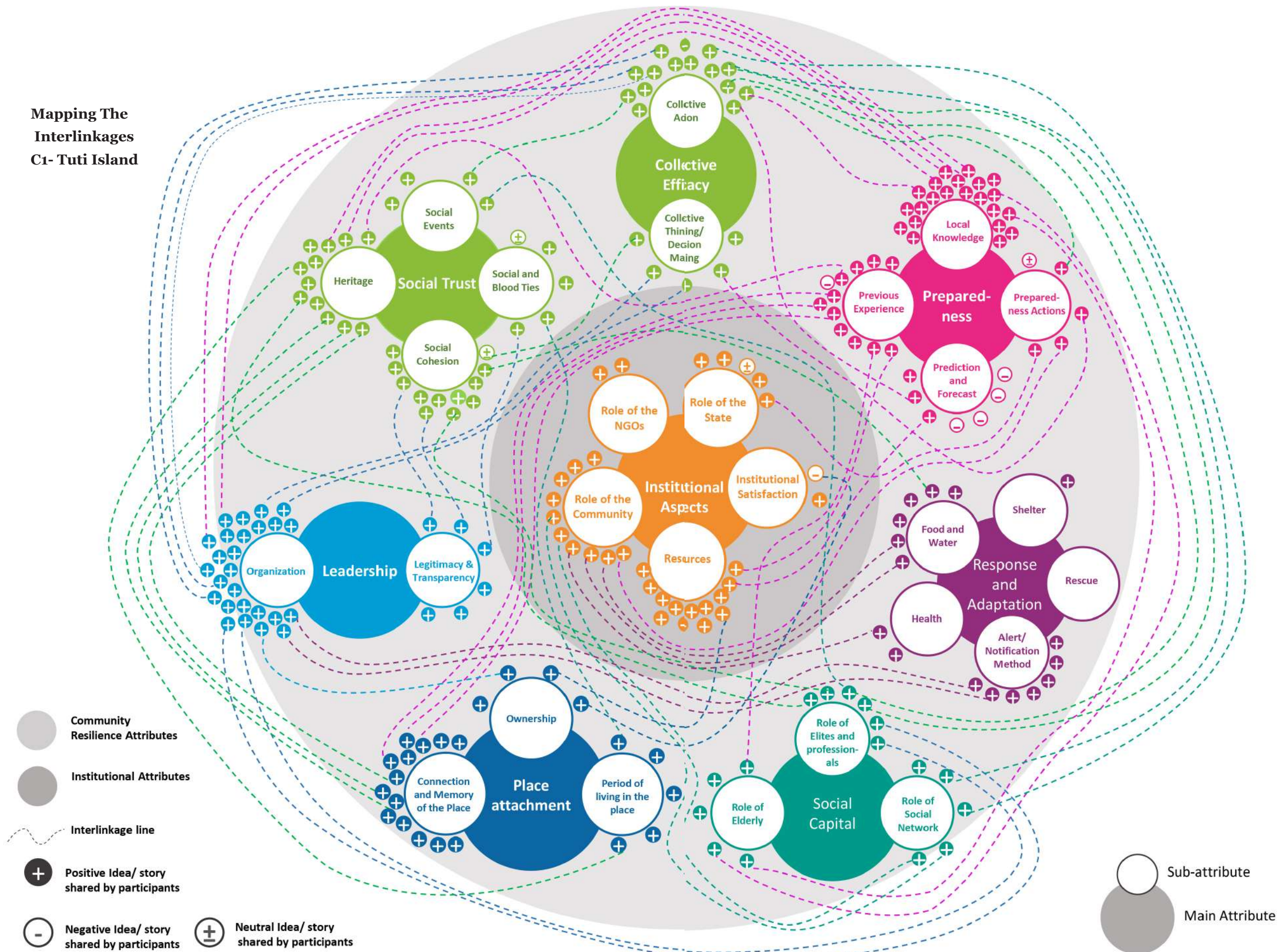


Figure 62- Future Roles in Adaptaion  
Source: Author.



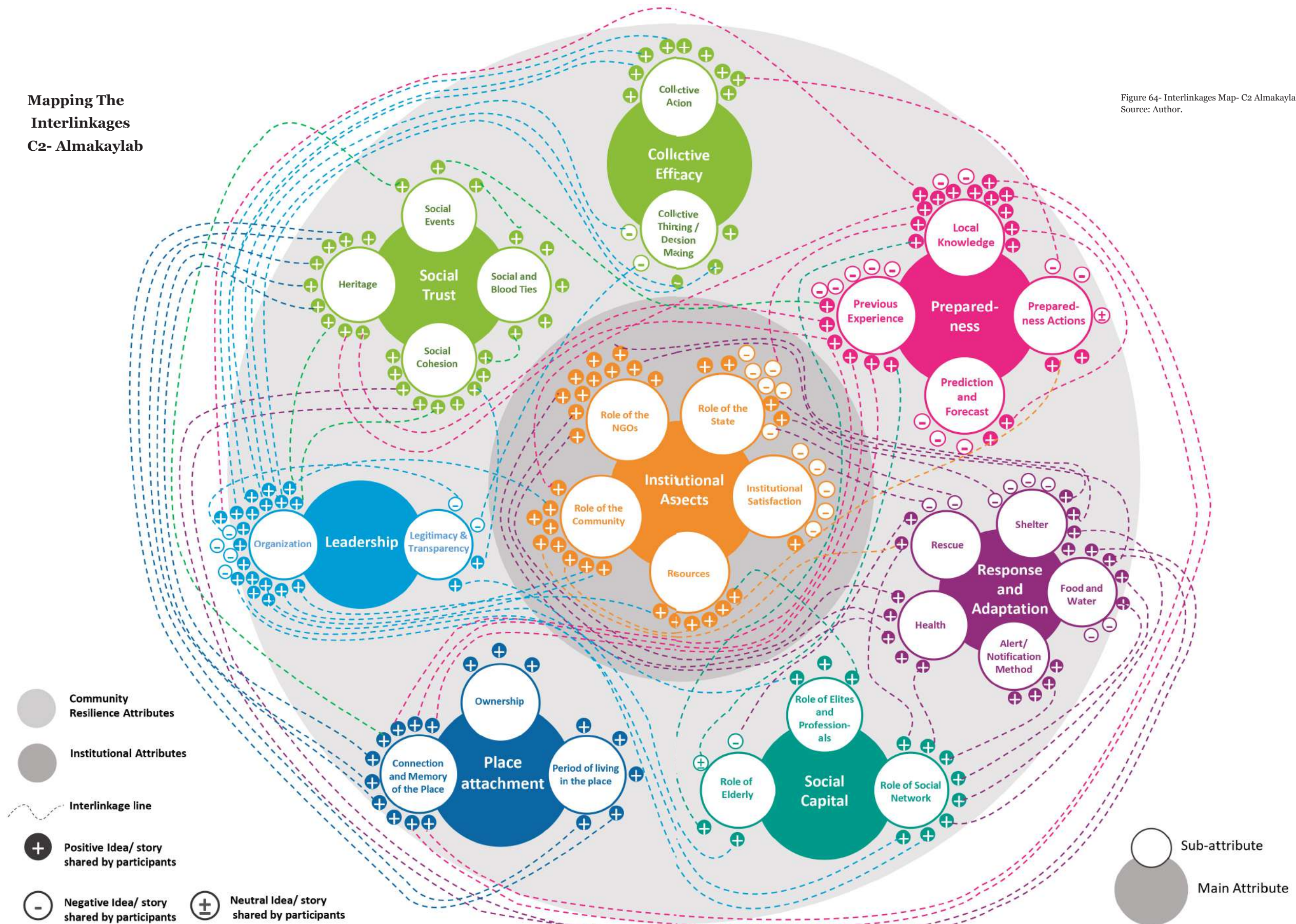
**Mapping The Interlinkages**  
C1- Tuti Island





**Mapping The  
Interlinkages  
C2- Almakaylab**

Figure 64- Interlinkages Map- C2 Almakaylab  
Source: Author.





## Mapping The Interlinkages

The previous analysis of each attribute already confirms the high interlinkage between the attributes themselves, in other words, the interlinkages between the attributes are manifested through the nature of the attributes in the first place and through the empirical investigation of the two case studies, to make this even clearer, the attributes and their interlinkages are mapped to provide a visual illustration.

In the first case study of Tuti, a strong link between local knowledge, heritage, and organization, also between previous experience and connection to the place. Heritage was also strongly connected to place memory and the period of living in the place.

In general, the connection between preparedness and the other attributes was the most significant, While the connection between response and adaptation to other attributes was the least significant.

The second case study of Almakaylab had a high link between the organization and (the role of the community, collective efficacy, heritage, and social network), the most significant connection is between response and adaptation and (role of NGOs, role of the community, social network, and social cohesion). Preparedness was not as significant as in the first case study.

**E.g., link of local knowledge to heritage: “There are techniques that we Tutians inherited from our ancestors, like the human barrier that was performed in the flood of 1988, and we used this year also”.**

**E.g., link of response to social cohesion and social network: “All the neighboring villages helped us, they provided us with water and food when the flood came, there was no functioning bakery to make bread here, they brought their aid in the main road”.**

In conclusion, despite the different dynamics of interlinkage in the two case studies, there were common traits between the two, like the link between organization and, collective thinking and collective action, also the high link of the role of the community in the institutional aspects to the other attributes, and finally the poor link of the role of the state to the rest of the attributes.

# Chapter 5: Discussion

## 5.1 DRM institutions in Sudan

The first research question about the situation of DRM institutions in Sudan has been partially answered by the review of DRM institutions in the previous chapter, the review manifested the high centrality of DRM at the national level, and the high delegation of the national roles to the NGOs, also it showed the ambiguity in defining the role between the different institutions and between the national government and the province government, as well as a poor commitment to national and regional strategic DRR frameworks. The institutional aspects in the empirical study show the actual situation and performance of these institutions in reality.

Both case studies show the weak role of the state in DRM, despite the civil defense being considered the main institution for DRM, their role was limited to helping tutians in their preparedness for the flood and providing drinking water in Almakaylab case. Although their role was slightly higher in Tuti due to various reasons like the proximity of Tuti to the center/ capital city, and the social capital of tutians and their connection to civil defense, the role of civil defense, in general, is weak and is not compatible with its mandate of being the national body of DRM. As mentioned before, the NGOs are taking a major role in disaster response in Sudan, even more than the state itself, so in Almakaylab they played a big role in humanitarian relief, from medical services to shelter provision and water, sanitation and hygiene WASH services. In Tuti NGOs didn't have a significant role for a simple reason; tutians always managed to keep the flood as a hazard, meaning that there was no actual disaster of human, material, or economic losses, so there was no need for the response of the NGOs.

The institutional roles of the community were evident in both case studies, the communities were able to perform preparedness roles, resource, and human mobilization, and response actions like alerting mechanisms, rescue, and provision of food, shelter, and health measures. These roles differ according to many factors and from one community to another.

## 5.2 Community resilience, Coping and adapting capacities

The empirical analysis of the two case studies shows the high coping and adapting capacities of Tuti and Almakaylab, these capacities form their resilience, from responding to the disaster to returning to the normal situation and building back better, this is happening at different levels in the two different communities, although both of them are rural communities and expected to have high resilience (Rapaport et al., 2018) their nature of their resilience is different, this is why it is important to understand the underlying reasons of the difference in resilience degree and type. From the literature and confirmed by the analysis, it appears that coping and adapting capacities at the community level are highly supported by the social aspects of social trust, social capital, collective efficacy, and place attachment.

Social trust seems to be the floor supporting all the collective actions of the community, (Norris et al., 2008) consider resilience as a group of collective and adaptive capacities, and the resilient community is not a group of resilient individuals but how these individuals act collectively to be resilient, all of this needs a solid background to be built on, this background is social trust. In both Tuti and Almakaylab this was evident, the social trust allowed the communities to organize themselves, think collectively, act collectively, and take actions collectively.

From the empirical work, it is apparent that the most important factors for social trust are heritage and social cohesion, for Tutians the heritage was mostly about their ancestors when they migrated from north Sudan and were the first Sheikhs to teach Quran and the first to build a mosque in Khartoum, also how their ancestors have fought the colonizers and didn't let them take the land of their island, lastly and interestingly they had a significant heritage about the flood itself and how their ancestors fought the river flood for decades, this unique situation is only found in a few areas of the world where a local community has its heritage related to resisting a natural disaster. In Almakaylab heritage also played an important role in social trust specifically and in the community resilience generally, heritage in Almakaylab is also related to their ancestors settling in the place, and to the values and manners they inherited from them, for example, they check on each other almost daily and help each other whenever help is needed, therefore the collective action of rescue and response to the flood was not something imposed or obligated to do but rather a spontaneous

action. The role of heritage in resilience is not highlighted in the literature but heritage has always a connection to the way a community view itself and how the individuals interact with each other, and that doubtlessly affects the resilience of a community.

The tribal nature in both case studies was unmistakable, the tribal behavior and tribal structure have been long inherited in the Sudanese community since the beginning of the 16th century (El Zain, 1996), both communities have a dominant tribe in the area and then other tribes have migrated, settled and merged with the dominant one, this cohesion between the tribes is very important and critical, in some area of Sudan tribal conflicts have led to civil wars. This connection to tribe and kinship relations was also obvious when the participants were asked about the main factor affecting social cohesion, the majority in both case studies say that it is the family and blood relations, with a higher percentage of this belief in Tuti 89% than in Almakaylab 62%; the reason could be that Tutians compare themselves to their surrounding urban areas in the capital where these family and blood ties are not as obvious as in Tuti, while in Almakaylab most of their surrounding areas have these ties and they don't see it as significant.

Social capital is well known in the literature to play an important role in resilience, the empirical study confirms that, and illustrates the different types of support, investment, and resources impeded within the community to benefit the community, from the local knowledge that elderlies have in Tuti to the donations and material support that Makaylabi people received from their relatives and social network. Exploring and identifying these social capitals is very important for understanding and measuring the resilience of a community.

Place attachment has been mentioned in the literature as an important factor in disaster recovery (Cutter et al., 2010; Norris et al., 2008), for Tutians it was a big motive for them to defend their land against the flood, for Makaylabis it was important for the rebuilding of the houses. Diving into the components of it we find that ownership, period of residency in the place, and also connection and memory of the place are all important for forming this place attachment, but the latter is the most important, memories related to previous experiences weather related to the flood or not formed the connection to the place in both the case studies, also it was evident that pride and identity were the biggest meaning of belonging to the place.

Leadership, organization, and legitimacy are concepts usually related to formal institutions, but if we also consider the community as an informal institution these concepts apply and can be examined within the community. Leadership



has been examined through organization, legitimacy, and transparency, the organization played the key role in mobilizing the community and being effective in the preparedness in the case of Tuti, and in response and adaptation in the case of Almakaylab, the organization in both communities relied on committees representing the community, this practice of having committees is a local way of how people manage their matters even before the flood, Tutians have different committees for different matters, and also Makaylabi people, especially for services provision and have a representative in front of the government.

Preparedness is also highlighted in the literature of being a key component for resilience, it was examined through the components of prediction and forecast, preparedness actions, local knowledge, and previous experience, the latter two were the most significant in both case studies, previous experience is mentioned in literature as a factor of resilience (Cutter et al., 2010), but the local knowledge is addressed very few times as a component of resilience, the traditional environmental knowledge like the direction of wind and clouds, the watercolor and level monitoring, played a vital role in the preparedness and response to the river flood performed by the community of Tuti, the work of (Cohen et al., 2016) highlighted the role of healthy elderlies in increasing the community resilience through their social roles and experience, this research proves that they also play a very important role in preserving and transferring the local traditional knowledge related to disaster resilience like in the case of Tuti.

Response and resistance of natural hazards are very rarely mentioned in the literature as part of resilience. Actually, most of the critical activities that determine that this hazard will stay a hazard or turn into a disaster happen in the response or resistance phase in the case of Tuti, tutians never took the flood as something that they have to surrender to and let happen, but as something that they have to be active about, monitor, and response to in order to protect themselves from the disaster, this is also a controversial matter, and the question is should we resist natural hazards? This also depends on the size of the hazard and resistance capacity, as it is not wise to face the lava of a volcano if you don't have the power and capacity to face it. In Almakaylab for example, people also didn't have the capacity to face the flood so they turned to responsive actions of saving themselves firstly and later providing food, shelter, and health services with the collaboration of other actors, trying to prevent further disasters of death, famine, and diseases.

Adapting capacities at the community level in both case studies were evident, including the simple form of adaptation of going back to the normal situation,

like in the case of Almakaylab where many rebuilding activities of the damaged houses were conducted by local efforts of Nafeer, and supported by donations from the social network. Also including the sophisticated type of adaptation of building back better through learning from previous experiences and developing ways to avoid or reduce future disasters, Tutians did that through learning from repeated floods every year and developed technical and organizational ways to manage the flood. For the Makaylabis the experience of the flood is relatively new but they also learned that their houses are not resistant enough and started changing the building material to cement blocks instead of mud bricks, this in itself is an adaptation practice. Adaptation takes time and resources, for it to be effective it needs to be combined with the efforts of other actors like NGOs and most importantly the State.

### **5.3 How can local communities help DRM institutions?**

As illustrated in the previous section that local communities have considerable coping and adaptation capacities and can play different institutional roles. The situation now is that there is a type of compulsory decentralization of DRM in Sudan, although in papers and documents, it looks like the state is taking the central role but in reality, the local communities struggle almost alone (except for the help from NGOs sometimes) and they find themselves forced to improvise and play the roles of the state, this could better be arranged if there is mutual consensus between the state and the communities on who has the capacity to take which role, in other words, doing a proper decentralization, with authorities, resources, and power being delegated to the community along with the responsibility, because decentralization shouldn't be only adding more burden to the community that is already in crisis, the study of (Iqbal and Ahmed, 2015) shows that decentralization is mostly significant of DRM when the political decentralization is accompanied fiscal/ financial decentralization.

From the empirical work, the idea of distributing the roles of disaster risk management between the community, the state, and civil actors seems to be feasible and can be realized, the participants were asked if they think the community should handle everything, or the state should take all the responsibility, or it is better to distribute the roles, the majority in both case studies said the last option is the one they prefer, then later they were asked about how these roles could be distributed, the majority of the participants voted for the state to take 75% of the roles, meaning the main load, and the community to take a medium to high role.

This type of community involvement and consulting them on what they think they can achieve is important and directly relates to practical aspects of DRM decentralization, DRM co-production, and community-based DRM, all of the three mentioned concepts have a close meaning, they differ in the level of responsibility and role allocation between the state, the community, and the other actors (e.g. NGOs)

In the global south, many local communities have a tribal nature that links to the precolonial era, especially in the rural areas, these communities have potential, values, organization, heritage, and knowledge that can be utilized to better plan DRM as have been proven by the empirical work of this research.

## Chapter 6: Conclusion and Recommendations

### Conclusion

The research has illustrated the high level of integration and interlinkages between community resilience and its role in reducing the general consequences of institutional vulnerability through the performance of some institutional roles by the communities themselves, which also reflects the high capacities and under-explored potentials of local communities and opens new prospects for DRM in the global south.

On the institutional level, it can be concluded that the official DRM institutions in Sudan are extremely fragile and are delegating many of their disaster response roles to the NGOs. On the other hand, local communities are performing many of the DRM roles on the local level, and reflecting a huge potential for coping and adapting capacities despite the lack of resources and guidance offered to them, it can also be concluded that each community has its own dynamics and different levels of coping and adapting capacities, as we saw in the two case studies, yet common factors were noticed like that social trust is the base of any collective action in the community, and that the ability of the community to think and act collectively is directly affecting the community organization, which is important for all phases of DRM.

Local communities appear to be willing to collaborate with the state and other actors to take part of the DRM responsibilities, especially in the preparedness and response phases, yet they think that the main responsibility should be taken by the state itself.

This research has shown that local communities have a lot to offer when it comes to disaster risk management in the contexts of fragile states, simply because survival is an instinct, they would spontaneously find alternative ways to replace and fulfill the roles of the state, yet, disaster is getting more and more severe and frequent, and the community's limited capacities won't be enough to face them. Therefore, collaboration and planning, and management of disasters including all sectors and putting the community in the focus point is needed.

By investing in building the capacities of local communities, states or NGOs can

save a lot of time, money, and lives in case of disasters. State fragility is something out of the hand of the planners and urbanists, yet they are required to deal with it and work under it in the global south, thinking of how to manage disasters in such circumstances is very important, this research shows that roles can be distributed between the community, the state, and the civil society with special consideration to the specifics of each case and state context.

In other words, community-based DRM, DRM co-production, decentralization of the roles, and best allocating them among the actors of DRM look promising in such contexts of fragile states.

For the sake of a more efficient DRM and the facilitation of decentralized DRM in Sudan, the following recommendations are provided:

- A serious reform of DRM institutions is needed, with less centralization on the national level and delegation of some authorities to the province level with the establishment of the concerned DRM bodies in each province, also the establishment of a national DRM body to clearly set the roles and responsibilities of DRM among the actors to avoid duplication and ambiguity of roles.
- An easy and immediate action with a significant impact is the activation of early warning systems and channels that already exist in the metrological authority and ICPAC, these weather forecasts and early warning reports need to be communicated punctually to the local communities.
- The willingness of the communities to cooperate and them having the basic organizational structure is the foundation for DRM decentralization, yet communities have different levels of ability to take part in DRM; therefore, a tailored program is needed for each community to build its capacity before integrating it in the DRM structure and delegating official roles to it.
- This research is one of the few to address the capacities of local communities in DRM, more deeper research is needed to understand how local communities can be involved in the national DRM policies, strategies, and plans.

### **Linking to the theory**

Since the independence of Sudan in 1956, and after half a century of British colonization, the newborn country has inherited a collapsed and fragile political system, and an internally ripped social fabric due to the divide et impera strategy that colonizers followed to rule Sudan. The recovery was not easy, it is even debated if it ever happened. Sudan is still suffering from the consequences of colonization, especially at the political and managerial level; the highly centralized

ruling system that is reflected in all managerial aspects including DRM is actually inherited from the previous central colonial system. Sudan is no exception from the other previously colonized countries in the global south, many of these countries inherited northern systems that the north later discovered that they are no longer valid and changed them, but the south is still using them, for Istanse, in the field of planning (Watson, 2009a) says “Post-colonial governments tended to reinforce and entrench colonial spatial plans and land management tools, sometimes in even more rigid form than colonial governments”, also (Fox, 2014) highlighted how colonizers “... left in their wake a legacy of underinvestment and ad hoc urban governance structures”.

The question is, are we going to blame the colonizers forever? The southern theory calls for an understanding and documenting of southern history from a southern lens and also looks for southern solutions through the social sciences, including urban planning and DRM.

While decentralization is now called for in the global north for the sake of better DRM, or perfecting DRM, decentralization of DRM in the global south looks like a necessity for survival, we don't have to invent the wheel by going through the same top-down approach of conventional DRM that the north has gone through and now starting to change it knowing that is not the best approach, we now have the knowledge to call for DRM decentralization in the global south, saving precious years of experimenting and investing them in real development.



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## مستخلص

يتسبب تغير المناخ والوصول إلى الحدود الكوكبية في حدوث المزيد من الظواهر الجوية المتطرفة المتكررة والكوارث المتكررة ، الأمر الذي يتطلب فهمًا وإدارة أفضل للكوارث من العلماء والمهنيين والسياسيين والمجتمع المدني.

؛ تم تسليط الضوء على أهمية قياس المرونة أو قدره على DRM في الأدب المختص بإدارة مخاطر الكوارث الصمود والضعف عدة مرات ، وقياسها أمر بالغ الأهمية لتقييم المخاطر ، وتحسين التخطيط ، والتخفيف ، والتكيف مع الكوارث.

يهدف هذا البحث إلى فهم أفضل لسمات مرونة المجتمع وضعف المؤسسات ، والصلات المتبادلة بينهما ، لا سيما في الجنوب العالمي حيث توجد البلدان الأكثر ضعفًا. تقع دراستنا الحالة اللتان يتم التحقيق فيهما في هذا البحث في السودان: -1 جزيرة توتي: جزيرة في قلب الخرطوم تمثل بيئة نقية وفريدة من المرونة المجتمعية تجاه الفيضانات ، -2 قرية المكايلاب: والتي تمثل البيئة السائدة النموذجية حيث تتفاجأ المجتمعات بالفيضانات.

تظهر النتائج أن السمات مترابطة للغاية بطبيعتها ، وكذلك في الوضع الحقيقي للكارثة. تتمتع المجتمعات المحلية في الجنوب العالمي بقدرات كبيرة على التكيف والتأقلم, مما يساهم بشكل مباشر في قدرتها على الصمود ، ومن ناحية أخرى ، فإن هشاشته الدول ومؤسسات إدارة مخاطر الكوارث الرسمية في هذا السياق تجعل دورها شبه معدوم. لحسن الحظ ، لوحظ وجود إمكانية للإنتاج المشترك لإدارة مخاطر الكوارث ولامركزية إدارة مخاطر الكوارث وإدارة مخاطر الكوارث القائمة على المجتمع ، حيث يمكن للمجتمعات أن تلعب دورًا نشطًا في إدارة مخاطر الكوارث في المستقبل.

## إقرار

هذه الرسالة مقدمة في جامعة عين شمس وجامعة شوتجارت للحصول على درجة العمران المتكامل والتصميم المستدام. إن العمل الذي تحويه هذه الرسالة قد تم إنجازه بمعرفة الباحث سنة 2023

هذا ويقر الباحث أن العمل المقدم هو خلاصة بحثه الشخصي وأنه قد اتبع الأسلوب العلمي السليم في الإشارة إلى المواد المؤخوذه من المراجع العلمية كل في مكانه في مختلف أجزاء الرسالة..

وهذا إقرار مني بذلك،،،

التوقيع:

الباحث: آيه التوم بابكر محمد

التاريخ: 07/24/2023

# التدخلات بين قدرة المجتمعات على الصمود ضد الكوارث الطبيعية والضعف المؤسسي

مقدمة للحصول على درجة الماجستير في العمران المتكامل والتصميم المستدام

أعداد: آية التوم بابكر محمد

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التوقيع

لجنة الحكم  
أ.د. ....الممتحن الخارجي  
أستاذ .....  
جامعة .....

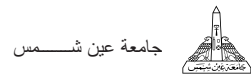
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أ.د. ....  
أستاذ .....  
جامعة ..... تاريخ المناقشة:.....

الدراسات العليا

أجيزت الرسالة بتاريخ:.....  
موافقة مجلس الجامعة .../.../...

ختم الإجازة  
موافقة مجلس الكلية .../.../...



07/24/2023





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