

# Chapter 21

## Building Community Resilience and Strengthening Local Capacities for Disaster Risk Reduction and Climate Change Adaptation in Zongoene (Xai-Xai District), Gaza Province

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**Abstract** The occurrence of extreme climate events in Mozambique constitutes a great barrier to swift sustainable economic development due to associated human and material damages. As a result, the population lives in a situation of threat and instability. The most vulnerable societies in Mozambique are those inhabiting settling areas along coastal or river plains, and those whose economies are strictly related to resources highly sensitive to climate changes. The vulnerability factors of two communities in the lower Limpopo River were analysed using a participative tool, the top mecca. The Zongoene and Mahielene communities in the lower Limpopo River basin lack essential adaptation elements that enable responses to climate change and natural disasters. These elements are required nationwide and include a highly diversified economy and access to new production technologies. In addition and in particular, the Zongoene and Mahielene communities rely directly on the services offered by the coastal ecosystems that have been affected by the impacts of floods, droughts, sea level rise and tropical cyclones. Some activities for climate change adaptation were identified and discussed based on the weaknesses and strengths identified.

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## Introduction

Climate change has become the most complicated challenge, given that the impacts are already in place and are affecting a growing number of populations. As stated in the Intergovernmental Panel on Climate Change (IPCC) fourth assessment report, the climate system warming is clearly evident. Global atmospheric concentrations of carbon dioxide, the most important greenhouse gas, for 650,000 years were in the range of 200–300 ppm, but it has increased to about 387 ppm in the past 150 years, mainly because of the burning fossil fuels and, to a lesser extent, agriculture and changes in land use (IPCC 2007). The Sub-Saharan Africa is considered the region where there are the most vulnerable people to the impacts of climate change. The continent is already prone to erratic rainfall, droughts, floods and cyclones, and climate change will only exacerbate these on-going challenges. At the same time, Africa fight against poverty, environmental degradation, uneven land rights, high dependence on natural resources for subsistence, and the HIV & AIDS. These factors limit the ability of people and institutions to adapt to climate change (CARE 2006).

The geographical location of Mozambique is one of the main factors contributing to the country's vulnerability to extreme events, given that most of the tropical cyclones and depressions formed in the Indian Ocean enter Mozambique Channel and affect the Mozambican coastal zone. On the other hand, the country has an extensive coastline where numerous international rivers run towards the Indian Ocean. With the rise in global temperature it is expected that the frequency and severity of droughts within the country, as well as floods in coastal regions will increase (MICOA 2005). In that report, MICOA states that the vulnerability concept in the national context is associated to a variety of factors that contribute to it, where as far as climate change is concerned, the most relevant is on one hand the risk of occurrence of an extreme event such as droughts, floods, and cyclones, and on the other hand, the local capacity of resilience to such extreme events. The concept of vulnerability has been discussed in detail by Soares et al. (2012) who reviewed several literatures on vulnerability and found three definitions, which include a biophysical vulnerability, social vulnerability, and the IPCC definition that combines biophysical and socioeconomic vulnerability. While biophysical vulnerability addresses the degradation of environmental conditions, the social dimension addresses the processes and structures impacting on individuals/groups, be it political, social, historical, or economic.

In Mozambique, the human settlements and the most vulnerable societies are generally those located in riverine and coastal flood plains and those whose economies are closely linked with climate-sensitive resources (Artur and Hilhorst 2014). The poor communities of Zongoene and Mahielene are in the list of highly

vulnerable coastal communities in Mozambique. They are located along the flood plain of Limpopo River and in the coastal area. The rising sea level, a result of the global climate change, is a threat itself, but it is also a concern for the Zongoene coastal zone, due to salt intrusion into farming areas since a vast majority of the population finds in agriculture their main source of income (Balidy and Mahumane 2008; INGC et al. 2003). These communities generally have more limited adaptive capacity and are more dependent on climate-sensitive resources, which feature rainfed agriculture, exploitation of forest resources, and fishing activity.

A sound understanding of how livelihoods are managed and sustained is required to assure reduction of current levels of vulnerability and increasing adaptive capacity. By understanding the management of the livelihoods of poor communities, one can infer how people will be affected by the impacts of climate change and how they can respond using the resources available and what additional resources are needed, as well as how can we reflect and consolidate the strategic position to adapt to the effects of climate change successfully (Matavel 2012).

The present study aimed at assessing the vulnerability and the adaptive capacity of the Zongoene District Post to climate change effects using people's perceptions in two neighbouring communities, Zongoene and Mahielene.

## Study Site

The Zongoene District Post is located to the south of Xai-Xai District in the Limpopo basin, in the Mozambican Province of Gaza, between Latitudes 25°0'30" and 25°17'0" South and Longitudes 33°19'00" and 33°40'30" East (Fig. 21.1). It is a village located along the coastal zone and in the vicinity of the Limpopo river estuary, with an area of 505 km<sup>2</sup> and nearly 50 km of coastline. In terms of administrative division, the Zongoene District Post has three localities, namely Zongoene Headquarter, Chilaulene and Novela, with a total of 18 small villages and settlements (Balidy and Mahumane 2008). There are over 30,900 inhabitants in the District Post corresponding to a total of about 5200 households (Matavel 2012).

According to Gove and Boane (2001), Zongoene's climate is tropical humid characterized by two seasons, with a hot and rainy season occurring from November to March, and a cold and dry season from April to October. In the summer, this area is influenced by continental tropical depressions that form in the Southeast and carries heavy rains. The minimum and maximum annual mean temperatures are 20.2 °C and 30.9 °C, respectively. The average annual rainfall varies from 825 to 1145 mm, decreasing very rapidly from the coast to inner lands (MAE 2005).

The economy of Zongoene District Post is primarily agricultural, given that the Limpopo River that crosses the district grants fertilization to its banks and flood plains, making them suitable for production of numerous kinds of commercial crops including rice, wheat, beans, bananas and vegetables (Matavel 2012). The fertile



**Fig. 21.1** Localization of Zongoene district post (after Matavel 2012)

soil and good farming conditions make agriculture the main economic activity in this region. Despite the existing potential for the development of agriculture, the people practice subsistence agriculture, using rudimentary technology, with low yields, due to lack of adequate investments. This activity is mainly practiced by adults of both sexes. There are two agricultural seasons, first in the hot and rainy season, between the months of September to March, and the second in the cool and dry season, between April and August. Cultivation takes place mainly in low-lying areas, which are more fertile, yet prone to flooding, but it is also performed in high land but unsuitable soils with high permeability and low nutrients concentrations along the coastal dunes. Maize, cassava, rice, sweet potatoes, beans, peanuts and vegetables are the main crops cultivated in Zongoene (Balidy and Mahumane 2008).

## Methods

In order to evaluate the perception, vulnerability, and adaptive capacity of people in Zongoene District Post the TOP MECCA tool was used for two communities in the District Post, namely the Zongoene Headquarter and Mahielene. Data for this study was acquired using participatory semi-structured interviews to community members, being 41 individuals in Mahielene and 38 in Zongoene. These groups were interviewed separately, and each of them comprised men and women, young and elderly people in varying numbers selected randomly from the communities. The TOP MECCA is a set of tools and included CVCA, CRiSTAL, PAVF, and VAP,

whose description is given below. Facilitation of the interviews consisted in the exposition and explanation of relevant concepts, followed by stimulation of an open discussion that often resulted in the consent among participants on what was needed at each step. The use of such tools and techniques has some serious limitations, which were dealt with whenever they became evident. That includes the time it took to address each issue and to reach an agreement; the fact that particular groups would eventually not agree with the majority—in which case further explanation had to be provided; and the patience and commitment from everyone involved that not always was present.

### ***CVCA: Climate Vulnerability and Capacity Analysis***

The CVCA tool (CARE 2009) provides an opportunity to link community knowledge with scientific information on climate change, which allows interested parts to understand the implications that climate changes have on their livelihood so that they are capable to assess the risks and to plan the adaptation. The tool provides guidelines for facilitating participatory process of vulnerability analysis of communities to climate change effects. The CVCA is designed to stimulate and strengthen planning processes by providing relevant information and specific to the local context, on the impacts of climate change and local vulnerability, where a valuable dialogue is promoted between communities during the process of data collection, as well as the dialogue between communities and stakeholders. The methodology can be used and adapted to collect and assess information aiming at drawing adaptation initiatives to climate change and integrating the issues of adaptation to the effects of climate change on the management of livelihoods and natural resources. CVCA emphasizes the understanding of how climate change will affect people and the livelihoods of target communities. The tool examines the hazards, vulnerability and adaptive capacity in order to create resilience for the future, also examines risks and conditions as well as any interactions between the two.

### ***CRiSTAL: Community-Based Risk Screening Tool: Adaptation and Livelihoods***

The CRiSTAL tool (IISD 2012) aims to create the foundations for community development and decision-making based on local projects, so that opportunities for adaptation can be maximized and misleading adaptation can be minimized. In particular, CRiSTAL helps planners and project managers to:

- Realize systematically the links between local livelihoods and climate;
- Evaluate the impacts of local projects on important subsistence resources for adaptation;

- Advise the adjustments that can adequately enhance a project's impact on the resources of the important means of support for adaptation.

### ***PAVF: Participatory Analysis of Vulnerability Factors***

The emphasis of the PAVF tool (Somda et al. 2011) is the identification of factors that expose some groups or means of survival to risk. The tool also identifies the factors that cause some community groups or survival resources to be more affected by climate risks, despite being in the same degree of exposure.

### ***VPA: Vision-Action-Partnership***

According to Somda et al. (2011) and Beaulieu et al. (2002), this tool enables (1) the drawing of the community vision against a particular impact in the case of project implementation be done successfully; (2) and the identification of actions that can be implemented by the community and partners to achieve the vision; The partners can be either the government institutions, national and international NGOs, private sector, or the civil society, among others.

## **Results**

### ***Livelihood Resources and Climate Hazards***

Natural resources occupy a predominant place in the lives of Mozambican rural communities. The success of its main subsistence activities (fishing, agriculture and livestock) and their survival depend directly on the availability, access, control and quality of natural resources such as water, arable land, forests and pastures, (Hahn et al. 2009; UNDP 2009; CDS-ZC 2010; UNEP 2010). The collected data show that the members of the surveyed communities benefit from forest resources for their survival, and they extract from these resources the necessary material to build houses and craft objects, the firewood and fruits for consumption and production of beverages that are marketed locally, making these alternative sources of family income. In turn, the fishing is considered one of the main alternative activities implemented by the community to mitigate the effects of bad harvests observed in Zongoene, as a result of floods and drought.

Through the mapping of sensible resources available in the Zongoene and Mahielene communities performed in a collective manner, as illustrated in plate 21.1, it was possible to identify the resources and assess their degree of





**Plate 21.1** Process of mapping the survival resources and climate hazards in the Mahielene community. Community members sat in groups around a flipchart

exposure to climate related hazards. The resources identified are as follows: *natural* which are land, forest, sea; *physic* which include water holes, agriculture implements, fishing boats and nets; *financial* which comprises sale of fish, livestock, and forest products; *human* comprising farmers, cattle breeders, and fishermen; and *social* consisting of church, fisherman association, and woman association. In addition, the hazards that occurred were identified and the regions where they have occurred were equally mapped, based on the information provided by the witnesses. The potential hazards included floods, droughts, and strong winds, as illustrated in Table 21.1.

The degree of exposure of the livelihood resources is summarized in Table 21.1, where three climate hazards are considered. In the villager's perception within the Zongoene Headquarter and Mahielene communities, the degree of exposure of livelihood resources to climate hazards varies a great deal between resources and hazards, with some resources being not exposed at all to a particular hazard, while others are fully exposed to that hazard. In the end, each identified resource is exposed to droughts, floods, or strong winds, and in some cases to more than one hazard.

### *Adaptation Strategies*

Adaptation is a process that enables societies to cope with an uncertain future. Adaptation to climate change involves taking right steps to reduce the negative

**Table 21.1** Resources and their degree of exposure

Hazards	Low exposure	High exposure
Droughts	Sea, fishing nets, fishing boats, fish trading, breeding cattle, selling of forest products, fishermen, church, associations	Land, forest, holes, cattle trading, farmers, cattle breeders
Floods	Forest, church, Sea, cattle trading	Land, holes, agricultural implements, fishing nets, fishing boats, farmers, associations
Strong winds	Water holes, agricultural implements, cattle trading, farmers, church and associations	Land, forest, sea, water holes, fishing nets and boats, fish trading, trade of forest products

effects of climate change (or exploit the positive ones) by making appropriate amendments and adjustments (UN-OHRLLS 2009). According to the IPCC (2001) adaptation is seen as an adjustment in natural or human systems in response to actual or expected environmental change, which moderates harm or exploits beneficial opportunities. Adaptation involves dealing with climate change taking steps to reduce the negative effects, or explore the positive, making appropriate adjustments (UNFCCC 2006). For INGC (2009), the adaptability reflects the potential to implement planned adaptation measures, therefore, relates to human deliberate attempts to adapt or cope with the change. Adaptability refers to the combination of all forces, attributes, and resources available to an individual, community, society or organization that can be used to achieve established objectives. This includes the conditions and characteristics that enable society at large to access and use of social resources, economic, psychological, cultural and those related to the way of life, as well as access to information and governance institutions necessary to reduce vulnerability and deal with disaster consequences (IPCC 2012).

There are many options and opportunities to adapt to the impacts of climate change. These range from technological options such as increased coastal defense structures, the individual behaviour change, such as reducing water use in times of drought, use of mosquito nets, early warning systems for extreme events, improved management water, improved risk management, various insurance options and biodiversity conservation.

For each identified climate hazard, members of the Zongoene and Mahielene communities indicated three most severe impacts based on their collective experience, as well as three adaptation measures (Table 21.2) that could be incorporated into a strategy at the District level. Further, an analysis of the way each livelihood resource influences the chosen adaptation measure was performed. All resources have a moderate to strong influence on the various strategies, except those listed in the third column in Table 21.2. The community suggested strategies to cope with the impacts of strong winds are influenced by a vast majority of the resources listed in Table 21.1. These strategies include (1) building of houses using conventional material, as it is currently done, but employing innovative methods and models that assure more stable houses are built; (2) planting trees in areas designated for crop



**Table 21.2** Livelihood resources and their degree of exposure to climate hazards in the Zonguene Headquarter and Mahielene communities

Hazards	Impacts	Adaptation strategy	Resources with no influence on strategy
Droughts	1. Destruction of crops 2. Livestock death 3. Water shortage for livestock	1. Small business development 2. Livestock extension 3. Construction of dams	Land, sea, church, animal traction
Floods	1. Destruction of crops 2. Livestock death 3. Emergence of epidemics	1. Dike construction 2. Make small business 3. Organize transport to clinic	Land, sea, fishing boats and nets, farmers, breeders, associations
Strong winds	1. Destruction of homes 2. Destruction of crops 3. Destruction of trees and early fruit drop	1. House building using conventional material 2. Planting trees to serve as windbreak curtains 3. Development of small alternative business	Forest, associations, church

culture as a way to reduce the windstress acting over the crops; (3) and development of alternative business as a mean to generate income after a climate hazard has struck the villagers.

### *Vulnerability Factors*

In the theory on risk and vulnerability due to climate change, the vulnerability must be analysed taking into account three main components: weakness or exposure, susceptibility or sensitivity, and adaptive capacity or resilience. Where the fragility or exposure, is the physical and environmental component of vulnerability, which defines the extent to which a population group is likely to be affected by a dangerous phenomenon depending on their location in the same area of influence, and in the absence of physical resistance to its spread (Braga et al. 2006). For the IPCC (2012) exposure is used to refer to the presence of people, livelihoods, environmental services and resources, infrastructure, or economic, social or cultural assets in places that may be adversely affected by physical events. On the other hand the susceptibility is the socio-economic and demographic component, which makes the predisposition of a population group to suffer damage against a dangerous phenomenon. And resilience is the behavioural component, community and political, which limits the ability of a population group undergone a dangerous phenomenon to absorb the shock and adapt to return to an acceptable level (Braga et al. 2006). According to the IPCC (2012), resilience is defined as the ability of a

system and its components to anticipate, to absorb, to accommodate, or to recover from the effects of a potentially hazardous event in a timely and efficient manner.

The vulnerability factors in the Zongoene and Mahielene communities were analysed collectively in terms of the amount of people exposed to a particular climate hazard, and the amount of people whose income activities are sensitive to the impacts of climate change. A summary of the results is presented in Table 21.3. As can be seen, the entire population in the sampled communities is exposed to a number of climatic impacts, including the loss of crops as a consequence of severe droughts and floods, the shortage of water for livestock that persists during prolonged droughts, the epidemics caused by consumption of inappropriate or untreated water and mosquitoes during the seasonal floods, and the destruction of houses that follow each cyclone and strong wind events. Each of the selected climate hazards affects the entire community in one way or another, and this contributes to a greater vulnerability.

The income generation activities practiced by the people in the two communities are in general very sensible to the impacts of climate hazards, meaning that very often the occurrence of either drought, floods or strong winds translates to a major loss of income by the villagers. Alternative sources of income have to be activated by them, otherwise the people get into a total catastrophe. The activities or sources of income here refer to the rainfed agriculture practiced by almost everyone in the community, the breeding of cattle that makes use of the low-lying lands prone to both drought and floods, exploitation of forest products that is conditioned during and after strong wind events. Apart from the activities undertaken by the villagers, the methods used in house construction as well as the location where houses are usually built are highly sensible to selected hazards that result in the destruction of infrastructure. The people still build infrastructures in places known to have been affected by past events in order to avoid facing new challenges in newly designated habitation areas.

Based on the identified vulnerability factors, the population in the Zongoene Headquarter and Mahielene communities has put forward the strategic elements displayed in Table 21.4, which includes the vision, proposed action, and potential partners. In terms of vision, the villagers want to see the crop production increased, water for domestic use available year around and in good quality, public health improved, as well as more stable houses built for their comfort.

## Discussion

The Zongoene Headquarter community showed that the region is highly vulnerable to the effects of climate change such as floods, droughts, and strong winds. According to INGC et al. (2003), the lower Limpopo River basin which encompasses the Zongoene District Post, is one of the most vulnerable region to natural disasters within Mozambique. This vulnerability is witnessed through the world-widely reported floods of 2000 and 2013 that led to dramatic examples of

**Table 21.3** People exposed to climatic hazards in the Zongoene and Mahielene communities, and amount of people sensitive to selected impacts of climate change

Hazard	Impact	Exposure	Sensitivity
Droughts	1. Loss of crops	100 %—Entire community is exposed given that everyone practices rainfed agriculture in the low-lying zones	100 %—Entire community is exposed given that everyone practice rainfed agriculture in the low-lying zones
	2. Livestock death due to lack of pasture	30 %—Because it affects only those who own livestock	30 %—Because grazing is made in the low-lying grasslands
	3. Shortage of water for livestock	30 %—Because it affects only those who own livestock	30 %—Because grazing is made in the low-lying grasslands
	4. Shortage of water for domestic use	100 %—Entire community uses water form holes	75 % the majority live in high lands, where water holes are hard to be dug.
Floods	1. Loss of crops	100 %—Entire community because everyone practice agriculture in two regions: the flood plain and transition zone to higher grounds	90 % because the majority of the most fertile soils are in the flood plain, and a smaller amount in the transition zone
	2. Livestock death	55 %—because the majority of villagers own a livestock and feed them in the low-lying zones	55 %—the majority of grazing lands are prone to floods
	3. Emergence of epidemics (cholera, diarrheal diseases, malaria, etc.)	100 %—the majority have access to water from holes, which is taken as potable and appropriate for human consumption	In Zongoene Headquarters, this problem affects only those living in regions without holes (20 %), while in Mahielene it affects the entire community (100 %), given that they all live in the same region
Strong winds	1. Destruction of houses	In Zongoene Headquarters, 20 % of population is exposed as they live in higher grounds, while in Mahielene the entire population (100 %) lives in a zone prone to strong winds and cyclones	10 % of population in Zongoene build houses in vulnerable region, while it is 50 % in Mahielene because half of the houses are located in higher grounds with no sheltering vegetation
	2. Destruction of crops	40 % of people in Zongoene and 90 % in Mahielene cultivate maize and cassava on higher grounds	40 % in Zongoene and 90 % in Mahielene because they all use the same variety of crops sensitive to strong winds

(continued)

**Table 21.3** (continued)

Hazard	Impact	Exposure	Sensitivity
	3. Destruction of trees and early fruit drop	45 % of the population, given that it affects only those with access to fruits for consumption, marketing and manufacture of beverages	30 % of the population, those who exploit forest products for a living
	4. Loss of boats	40 % of the population, those who practice fishing for a living	40 % of the population, those who rely on fisheries, and own a boat or canoe

**Table 21.4** List of elements of strategic vision, proposed remedial actions, and identified partners for the adaptation of the Zongoene and Mahielene communities in Xai-Xai District

Impacts	Vision elements	Actions	Partners
Crop destruction (drought)	Increase crop production	<ul style="list-style-type: none"> <li>• Opening and cleaning irrigation channels</li> <li>• Use of short cycle varieties</li> <li>• Use of seeds tolerant to drought</li> <li>• Use of fertilizers and improved seeds</li> </ul>	Government (agriculture)
Crop destruction (floods)	Increase crop production	<ul style="list-style-type: none"> <li>• Construction of drainage channels</li> <li>• Rehabilitation of dikes and placement of gates</li> </ul>	Government
Crop destruction (strong winds)	Increase crop production	<ul style="list-style-type: none"> <li>• Reforestation or building barriers with local vegetation and tree species.</li> <li>• Purchase of seeds, training in nurseries and planting techniques</li> </ul>	Government (CDSZC) NGOs
Death of animals (drought)	Increase the number of animals	<ul style="list-style-type: none"> <li>• Construction of dams</li> <li>• Opening water holes and dam construction</li> </ul>	Government
Shortage of water for domestic use	Sufficient and good quality water throughout the year	<ul style="list-style-type: none"> <li>• Opening water holes</li> </ul>	Government (DPOPH)
Emergence of epidemics	Improve public health	<ul style="list-style-type: none"> <li>• Ensure access to hospital services to the whole community</li> <li>• Ensure drinking water for the whole community</li> </ul>	Government
Contamination of water wells	To have sufficient good quality water throughout the year	<ul style="list-style-type: none"> <li>• Opening water holes</li> </ul>	Government (DPOPH)
House destruction (strong winds)	Stable houses and protected from the wind	<ul style="list-style-type: none"> <li>• Planting trees in coastal areas;</li> <li>• Construction of conventional homes</li> <li>• Nursery and training in nursery establishment and planting technique</li> </ul>	Government (CDSZC)

destruction caused by natural disasters in the basin. The region is not only vulnerable to flooding, since most of the basin receives less than 500 mm annually precipitation, but to other hazards as well. Droughts are common in this area and usually last longer than a single season. Despite the Limpopo basin be located outside the tropical cyclone zone, it is affected occasionally by tropical cyclones that carry heavy rains that may result in flooding within the basin. This happened for instance in the year 2000.

The disasters registered along the Zongoene community have had the following main impacts, in the perception of the local villagers: destruction of crops, death of animals, lack of water for domestic use and for the cattle, destruction of houses, destruction of trees, and contamination of water wells, among others.

Villagers in the Zongoene community have indicated the following adaptation strategies to the floods, drought and strong winds that arise from climate change: construction of dikes and drainage ditches, placement of gates, construction of dams and drinkers for cattle, construction of defense barriers to avoid saline water, exploitation of forest products, development of fishing activities, small business development, planting of trees along the coastal zone, creating nurseries, acquisition of small vessels, building houses using conventional material and new models, purchase of motor pumps, and drilling holes for water extraction.

Despite the country's potential for agriculture, in terms of arable land and availability of water resources, adaptation to adverse impacts of climate change will require the adoption of new technologies and improvement of agricultural policies, which includes the rehabilitation and extension of irrigation systems, the promotion of dry tolerant crop varieties, expanding the extension services, and providing financial services in rural areas with subsidized interest rates (World Bank 2010; Bambaige 2007; MICOA 2007). These strategies include some already indicated and well-accepted by the villagers in Zongoene community, as a way to minimize the impacts of climate change in the region, which shows the importance of local community involvement in the design of adaptation projects to climate change.

## Concluding Remarks

The participative work undertaken in the Zongoene District Post (Zongoene Headquarter and Mahielene communities) allowed the following conclusion to be drawn:

- The local communities identified as climate hazards the droughts, floods, and strong winds. And these hazards in the perception of the community can effectively cause the destruction of crops, animal death, house destruction, lack of water for various uses, water contamination in the wells, loss of fishing boats and nets, among others.
- The land, which is taken as one of the most important natural resources for the community's survival, is highly affected by droughts and this has severe impacts



because most farmers end up developing crop farming in upper lands that depend solely on rainfall. The rainfall on its turn is currently considered erratic throughout the southern Mozambique. The negative impact associated with the land also come from the fact that land is affected by the floods, and a great deal of villagers practice crop farming in the lower reaches, within the Limpopo River flood plain.

- Strong winds greatly affect fishing activity because the fishermen from Zongoene have little to no access to updated weather forecasts, which cause boats and other fishing materials to get lost during strong winds. Additionally this climate related hazard affects negatively the crop farming and housing in the Zongoene District Post, particularly those houses located in high and unsheltered areas.
- The agricultural implements as well as local knowledge on agriculture play an important role in the construction of dikes and drainage ditches, dams and reconstruction of houses, since these are considered survival resources and are readily available for a large part of villagers with the District Post.
- Regarding the development of small business as a mitigation strategy for the main climate hazards (drought, floods and high winds), the local community in the Zongoene District Post have in place a strategy that includes the sale of agricultural surpluses, sale of domestic animals, fish sale and sale of forest products.

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