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FOCUS ON INDIGENOUS KNOWLEDGE
SYSTEMS USED BY COMMUNITIES IN
CHIMANIMANI AND CHIPINGE DISTRICTS

Social Action Research

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1.0 Executive Summary



“THE COMPANY AUDITOR MUST GIVE ITS OWN REPORT ON THE DIRECTOR”

Recognizing the constraints that local people face in receiving warning information and the potential for Indigenous Knowledge Systems as a source of early warning information Action Aid commissioned a study to document known Indigenous Knowledge Systems relating to hazards that frequently affect Chimanimani and Chipinge districts. The study was tasked with the view to finding ways of infusing indigenous knowledge into modern early warning systems.

Guided by the objectives to consolidate indigenous knowledge systems, validate and document the Indigenous Knowledge System, and infuse the Indigenous Knowledge Systems with scientific systems for better preparedness the study used qualitative methods including Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) with purposefully selected knowledgeable individuals.

The findings suggest that prior to the proliferation of information technology which has enabled the widespread access and use of western knowledge systems, indigenous people used traditional signals to predict seasonal and weather changes which helped them in their day-to-day livelihoods including agriculture and preparation against everyday hazards.

The Indigenous Knowledge Systems (IKS) that came out of this study centred on hazards common in both districts, these include drought and floods. The use of indigenous knowledge has declined quite considerably, in this study, as anticipated it emerged that a few households are still using the traditional indicators to inform their actions relating to disaster preparedness and food security.

Many of the identified IKS indicators were predictors of food security/insecurity which in this report were framed as indicators of drought. The other set of indicators was framed as predictors of floods and the last of the group of indicators were framed as other.

Food security is of central importance to human existence, it is therefore not surprising that most of the discussions and indicators focused on signs that predict the availability or unavailability of food in the next season. Several indicators were identified in the discussions, Figure 2 provides a summary depiction of the signs that are used to predict food availability in the coming season.

Observations of these indicators provided important clues on whether the next season was going to provide sufficient food or was going to result in famine. Indicators of food drought included plants, where the vegetative conditions during specific periods of the year indicated normal or below-normal rainfall in the coming season. The community members pointed out that when trees such as Mutondo and Muuyu regenerate lush green, healthy and dense leaves it signifies good rains.

It emerged that plants do not only provide important signals through leaves, their fruits are an important indicator as well. The abundance of fruits signifies drought. Indigenous knowledge holds that if there is an abundant supply of specific fruits (Mazhanje, Nyii, Mutsikiri, Mauyu, Chakata, Mango and Shuma) it is a signal of drought.

Telestereographic indicators such as the moon also indicated drought especially if it was observed to be on a tilting position around the beginning of the rainy season. The birth of more girls than boys in a particular year signified productivity and was interpreted to mean a good harvest in the coming season.

Birds such as Mherepere or Nyenganga signal normal to above normal rainfall and potentially floods. If the birds fly around in great numbers the community believes this to signal flooding and therefore people prepare to move to higher ground. Short-term indicators of floods included gloomy overcast skies coupled with strong winds blowing from east to south; constant frog calls and restless cattle among other indicators.

Other indicators were not signaled imminent disaster but with no immediate clue on the nature of the disaster. In such cases, spirit mediums would be consulted to provide specific details of the imminent disaster. For example according to the study, participants there are not common with lions in Chimanimani, particularly in the wards where the study was conducted, therefore if a lion is seen or its footprints are found in the area, it is an indicator of imminent attack or disaster. This indicator is contextual and may require further consultations to interpret the type of hazard it signifies.

Spirit mediums would not only wait to be consulted, but they were also proactive and provided important warning information to the villagers' on weather changes including hazardous events. As recent as 2019 one spirit medium in Chimanimani is believed to have foretold the coming of COVID-19. Spirit mediums did not only pass warning information they go further to attempt to prevent or mitigate the effects of the hazard.

These indicators provided important early warning information triggering early action in the form of precautionary measures or ceremonies or rituals to plead with the gods to spare the community from the devastating effects of the predicated hazards.

The study found that the application of indigenous knowledge systems is constrained by a number of factors. These factors include the superiority of western knowledge systems, the conflict between IKS and Christian religion, few people having the knowledge and understanding of the indicators, and the lack of a policy framework to develop and promote the use of indigenous knowledge systems are some of the factors that stand limit the widespread application of IKS.

This study is an important starting point in the revival and consolidation of IKS. Going forward, the study recommends further studies with more anecdotal and empirical evidence, with particular emphasis on the lead time, availability, and perceived reliability in different disasters. Selected Early Warning Indicators should then be monitored in the future when disasters threaten and occur.

If found reliable and effective, these could be incorporated into Non-Governmental Organizations and government programmes, and Disaster Risk Reduction committees training both District and Ward levels through Community Based Disaster Risk Management (CBDRM) approach.

Ongoing development programmes could adapt to support the process; for example, forestry and livestock programmes in Chimanimani and Chipinge Districts could include suitable species which play a part in Early Warning, survival, and recovery.

There is significant work yet to be done at the policy level. Whilst the IKS debate is part of the systemic agenda in Zimbabwe, it is yet to reach the decision agenda level, despite consensus on the importance and potential of IKS.

It is therefore recommended that Action Aid and like-minded organizations use their advocacy capacity to lobby state actors to put the IKS on their agenda and formulate national-level policies that not only regulate but encourage the learning and application of indigenous knowledge systems.



Image 1: Thousands of displaced families including children across Chimanimani in need of aid following the devastation of Cyclone Idai

2.0 Introduction

Like all other districts in Zimbabwe, Chimanimani and Chipinge are affected by natural hazards such as floods, drought, and high winds amongst others. Nationally, the frequency and intensity of these hazards are on the increase, for example, Zimbabwe experienced Cyclone Eline in 2000, Cyclone Japhet in 2003, Cyclone Dineo in 2017, and Cyclone Idai in 2019.

ActionAid Zimbabwe together with its partners responded to the devastating effects of Cyclone Idai and is implementing various interventions in Chimanimani and Chipinge. In implementing the interventions, it was observed that the hazards mentioned above, despite an increase in frequency, the communities are nearly caught up off-guard. The prognosis of the problem is in part linked to the reliance on “modern” or “western technologies” for forecasting and predicting the occurrence of these hazards.

These technologies are not always accessible, especially in poor rural communities. Forecasts lack specifics and effective communication of the forecasts is often compromised therefore this is happening against the background of indigenous knowledge systems that were used by local people for the same purposes in pre-colonial times. In the post-colonial state, indigenous knowledge systems have largely been ignored yet there is potential for IKS to provide important warnings and forecasts.

Action Aid commissioned a study to document the Indigenous Knowledge Systems around these hazards from the perspectives and experiences of people in Chimanimani and Chipinge districts. The study was conducted in both Chimanimani and Chipinge districts with the major purpose of establishing Indigenous Early Warning Indicators and their efficacy in improving disaster preparedness.

The study further explored the synergistic relationship that exists between Indigenous Knowledge Systems (IKS) and Scientific Knowledge Systems (SKS). The study employed both Key Informant Interviews and Focus Group Discussions with relevant stakeholders in both districts so that key information could be extracted. The findings of the study point to the existence of rich information and indicators that were and can still be used to predict hazards. This study suggests that some of these indicators could be incorporated into locally managed Early warning Systems to increase empowerment and resilience of poor and vulnerable communities through effective and appropriate Early Actions.



Image 2-3: The state of Ngangu after Cyclone Idai, 27 May 2019

3.0 Background

The Cyclone Idai weather system hit the eastern part of Zimbabwe, a highly impoverished part of the country, on 15 and 16 March, with Chimanimani and Chipinge districts in Manicaland Province being the hardest hit. The cyclone came during a particularly challenging time for the country which is emerging from drought and is grappling with economic challenges that have exacerbated humanitarian conditions across the country.

Preliminary reports indicate that some 270,000 people with existing acute levels of vulnerability have been directly affected across all districts in Manicaland and parts of Masvingo and Mashonaland East provinces. Initial estimates indicate that 4,700 hectares of crops were destroyed in Chimanimani and Chipinge districts alone.

It is against this background that, the study seeks to answer the following questions: Action Aid commissioned a study to document the Indigenous Knowledge Systems around these hazards from the perspectives and experiences of people in Chimanimani and Chipinge districts. The study was conducted in both Chimanimani and Chipinge districts with the major purpose of establishing Indigenous Early Warning Indicators and their efficacy in improving disaster preparedness.



The study further explored the synergistic relationship that exists between Indigenous Knowledge Systems (IKS) and The Scientific Knowledge Systems (SKS).

3.1 Research Questions

1. What Indigenous Knowledge Systems are in place in both Chipinge and Chimanimani Districts as indicators of most severe hazards?
2. To what extent are these Indigenous Knowledge Systems useful in predicting natural hazards?
3. Is there any documentation to substantiate the use of Indigenous Knowledge Systems?
4. Is there any Framework for integrating Indigenous Knowledge Systems and Scientific Knowledge systems to improve disaster preparedness in both Chimanimani and Chipinge Districts?

3.2 Objectives of the Study

1. To consolidate indigenous knowledge systems;
2. To validate and document the Indigenous Knowledge System;
3. To infuse the Indigenous Knowledge Systems with scientific systems for better preparedness.



Image 4- 5: The state of Kopa after Cyclone Idai, 27 May 2019

3.3 The challenge of incorporating indigenous knowledge

Knowledge is defined by the Oxford English Dictionary (Trumble, 2007) as 'information and skills acquired through education or experience' or an 'awareness or familiarity gained by experience of a fact or situation'.

This can then be divided further into 'scientific knowledge and indigenous knowledge.' While the former is generally understood to involve western technology or techniques, there exists no concise definition of the latter.

Indigenous knowledge is referred to in a number of ways including, but not limited to, 'local knowledge', 'traditional knowledge', 'indigenous technical knowledge', 'peasants' knowledge', 'traditional environmental knowledge' and 'folk knowledge' (Sillitoe, 1998).

To summarize relevant literature, indigenous knowledge is a body of knowledge existing within or acquired by local people over a period of time through the accumulation of experiences, society-nature relationships, community practices and institutions, and by passing it down through generations (Brokensha et al., 1980; Fernando, 2003; Sillitoe, 2000).

Scientific knowledge is global in nature whereas indigenous knowledge is considered local. However, as with scientific knowledge, indigenous knowledge is dynamic in nature, continually influenced both by internal creativity and experimentation, and by contact with external systems (Flavier et al., 1995).

Knowledge, both scientific and indigenous, is intertwined with power and human relationships including social, political, technical, and economic elements. Indigenous knowledge is oppressed in a myriad of ways as a result of the marginalization, exploitation, powerlessness, cultural imperialism, violence and denial of existing knowledge placed upon its bearers (Laws, 1994; Young, 1988, 1990).

All these forms of oppression can occur simultaneously or independently of each other, but all contribute to the suppression of indigenous knowledge in a society where the scientific culture is dominant (Laws, 1994; Rist and Dahdouh Guebas, 2006).

Oppressed people, such as many indigenous populations, have largely remained outside the realm of academic discourse even though they are frequently the subject of academic analyses (Laws, 1994). Indigenous knowledge is based on diachronic observations accumulated over generations of detailed observation and interactions with local ecosystems (Dekens, 2007a).

Thus, indigenous people are clearly interested in changing social relations and structures and committed to adapting knowledge to achieve such changes (Laws, 1994).

Their knowledge is more qualitative and geographically specific in contrast to scientific knowledge, which is normally based on synchronic observations, tending towards the quantitative and more general in nature (Dekens, 2007a).

However, too often indigenous knowledge is hidden and dismissed by the tendency of scientific knowledge to deny the importance of the other (Agrawal, 1995; Davies, 1999; Laws, 1994; Rist and Dahdouh Guebas, 2006).

Indigenous populations in SIDS face difficult challenges including globalization, environmental pressures, marginalization, racism, and economic and health inequity (Edwards and Heinrich, 2006). These processes are external to a community but can impact it internally (intrinsic factors) through, for example, agricultural changes, migration, or loss of indigenous knowledge.

“THERE IS A NEED FOR A PARTICIPATORY PROCESS IN WHICH INDIGENOUS KNOWLEDGE IS SHOWN TO HAVE VALUE AND IS KEPT WITHIN THE COMMUNITY.”

This could potentially impact upon vulnerability levels of a community to environmental hazard(s) (Mercer et al., 2007). However, the ability of indigenous populations, such as those in Kumalu, Singas and Baliau in PNG, to survive environmental hazards is evidence of the applicability of indigenous knowledge (Anderson-Berry et al., 2003; Kelman, 2005; McAdoo et al., 2006)

Despite the use of both indigenous and scientific knowledge in such circumstances, the dominant view of indigenous knowledge as inferior to scientific knowledge can only increase as the centralization of indigenous knowledge databases in museums or other academic research institutes disempowers local custodians of indigenous knowledge (Agrawal, 1995; Rist and Dahdouh-Guebas, 2006).

Hence, there is a need for a participatory process in which indigenous knowledge is shown to have value and is kept within the community. It is essential that indigenous communities themselves have easy access to relevant research and information that may assist them in reducing their vulnerability to environmental hazards (Sillitoe, 2000).

To meet these challenges, the framework presented below has focused on the use of participatory techniques within Chipinge and Chimanimani Districts to integrate both indigenous and scientific knowledge within disaster risk reduction. It is hoped that this will be a useful tool for identifying how the two sets of knowledge may be successfully integrated within disaster risk reduction for indigenous communities in disaster-prone areas.

3.4 Framework integrating indigenous and scientific knowledge

The proposed framework is a process by which indigenous and scientific knowledge may be integrated to reduce the vulnerability of indigenous communities to environmental hazards. The framework is not identifying new knowledge but rather identifying how existing knowledge can be integrated to enhance the ability of indigenous communities to reduce vulnerability levels to natural hazards.

A process framework focuses on the process as key to achieving outcomes. However, the process itself should also be considered one of the key outcomes and is critical to achieving a just and sustainable outcome in substantive, emotional and, in the case of this framework, procedural terms (Agius et al., 2004).

As Agius et al. (2004) note, in many settings pre-determined processes prescribe the terms of indigenous participation with indigenous people having to conform to the dominant culture. The aim of this framework is to circumvent such a situation, enabling indigenous people to reach a consensus regarding ways to approach their vulnerability to natural hazards. The desired outcomes of this process consist of:

- reduced vulnerability to natural hazards;
- increased collaboration among stakeholders; and
- organized disaster risk reduction planning.



Image 6: The state of Ngagu after the effects of Cyclone Idai, 27 May 2019



Image 7: Women next to a stream collecting in Ngangu township where several houses were damaged by Cyclone Idai. The water and sanitation system was destroyed leaving survivors at a high risk of communicable diseases.

PROCESS FRAMEWORK INTEGRATION: INDIGENOUS AND SCIENTIFIC KNOWLEDGE[1]



FIGURE 1 PROCESS FRAMEWORK INTEGRATING INDIGENOUS AND SCIENTIFIC KNOWLEDGE

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- Step 1: Community engagement: Collaboration with community and stakeholders, Identification of community goals, and establishing rapport and trust
 - Step 2: Identification of vulnerability: Identification of intrinsic and extrinsic components, contributing to hazard vulnerability, identification through community situation analysis, and identification of priorities
 - Step 3: identification of Indigenous and scientific strategies: (past and present e.g. land use planning, building methods, social linkages, environmental strategies)
 - Step 4: Integrated strategy: Address intrinsic components to hazards, dependent on effectiveness level of each strategy identified

4.0 Methodology

A sample of 45 participants was purposively selected in Chimanimani (Ward 16 (6), Ward 21 (6) and ward 22 (7)) and Chipinge (ward 1 (12) and Ward 3 (12) participated in Focus Group Discussions (FGDs) and 2 District Development Coordinators from both districts.

Purposive sampling was done based on the assumption that the participants had the traditional knowledge pertaining to their environment.

These research participants involved a mixture of men and women aged 40 years and above. This age group was selected as per instruction from the client.

The purposeful selection of knowledgeable or information-rich enables the researcher to learn or gain a great deal of information about the issues of central importance to the purpose of study (Gentles, Charles & Ploeg, 2015). Therefore, the researchers only went to those people who in their opinion were likely to have the required information and be willing to share it.

The District Development Coordinators (formerly District Administrators) from the two districts were interviewed as key informants to inform how they appreciated and utilized the traditional indigenous knowledge in their districts.

These were selected because in their role they closely work with traditional leaders such as chiefs who are custodians of local traditions. This helped to triangulate and validate the responses from the study.

Data collection methods were primarily open-ended interviews which allowed interviewees to express their views concerning seasonal changes based on traditional climatic and weather knowledge.

This study was confined to the two districts and specifically Chimanimani wards 16,21 and 22, Chipinge wards 1 and 3. Data was collected based on the participants' recollections and knowledge of the signs and indicators, their meanings and significance, and precautionary measures taken after observing such signs.

These recollections were thematically analyzed and synthesized to align with the purpose of the study. Secondary data from peer-reviewed sources was also used to buttress, triangulate and validate primary data from key informants and focus group discussion participants.

Knowledge, both scientific and indigenous, is intertwined with power and human relationships including social, political, technical, and economic elements.

Indigenous knowledge is oppressed in a myriad of ways as a result of the marginalization, exploitation, powerlessness, cultural imperialism, violence, and denial of existing knowledge placed upon its bearers (Laws, 1994; Young, 1988, 1990).

All these forms of oppression can occur simultaneously or independently of each other, but all contribute to the suppression of indigenous knowledge in a society where the scientific culture is dominant (Laws, 1994; Rist and Dahdouh Guebas, 2006).

5.0 Findings

Prior to the proliferation of information technology which has enabled the widespread access and use of western knowledge systems, indigenous people used traditional signals to predict seasonal and weather changes which helped them in their day-to-day livelihoods including agriculture and preparation against common hazards.

This section discusses the findings from the study elaborating how some natural features, signs, animals, and plants were used in seasonal change predictions by people to sustainably prepare themselves against the risks of climate change, the effect on livelihoods, and the impact of natural hazards such as drought or floods.

By observing the behaviors of the indicators indigenous people were able to attach a particular meaning. These meanings were of significant importance in determining the next course of action.

In the focus group discussions conducted in the 5 wards, there were several indicators of food security/insecurity. The Indigenous Knowledge Systems (IKS) that came out of this study centred on hazards common in both districts, these include droughts and floods.

The use of indigenous knowledge has declined quite considerably, in this study, as anticipated it emerged that a few households are still using the traditional indicators to inform their actions relating to disaster preparedness and food security, “the information is now being circulated only to those who still hold trust and belief on the value of these IKS warnings and potential risks” Chimanimani FGD Ward 22. Below we present the hazards, signs and indications and the meanings attached by the communities.

The District Development Coordinators (formerly District Administrators) from the two districts were interviewed as key informants to inform how they appreciated and utilized the traditional indigenous knowledge in their districts.

These were selected because in their role, they closely work with traditional leaders such as chiefs who are custodians of local traditions. This helped to triangulate and validate the responses from the study.

The data collection methods were primarily open-ended interviews which allowed interviewees to express their views concerning seasonal changes based on traditional climatic and weather knowledge. This study was confined to the two districts and specifically wards 16,21 and 22 in Chimanimani as well as, wards 1 and 3 in Chipinge.

Data was collected based on the participants’ recollections and knowledge of the signs and indicators, their meanings and significance, and precautionary measures taken after observing such signs.

These recollections were thematically analyzed and synthesized to align with the purpose of the study.

5.1 Droughts

Food security is of central importance to human existence, it is therefore not surprising that most of the discussions and indicators focused on signs that predict the availability or unavailability of food in the next season.

Several indicators were identified in the discussions, Figure 2 provides a summary depiction of the signs that are used to predict food availability in the coming season. Observations of these indicators provided important clues on whether the next season was going to provide sufficient food or was going to result in famine.

5.2 Plants

Deciduous trees offer important clues through the process of shedding leaves in winter and the regeneration of the leaves in summer.

The specific species of trees that hold the clues include Mutondo (*Julbernardia globiflora*), Mukamba (*Pod mahogany*), and Muuyu (Baobab). According to FGD respondents in Chipinge ward 3 when these trees fail to regenerate new leaves it is a clear indication of drought.

On the other hand, when Mutondo and Mukamba trees regenerate lush green, healthy and dense leaves it signifies good rains and this was unanimously stated by elders in Chipinge. Health and dense leaves are a sign of good rains in the coming season and when you see these trees struggling to replace leaves they have shed is a sign that the season will not be good” Chipinge FGD Ward 3.

The baobab tree regenerates its leaves slowly after shedding off in winter, a quick regeneration process indicates a high probability of good rains. Plants do not only provide important signals through leaves, but their fruits are also an important indicator as well.

The abundance of fruits signifies drought. Indigenous knowledge holds that if there is an abundance supply of specific fruits (Mazhanje, Nyii, Mutsikiri, Mauyu, Chakata, Mango and Shuma) it is a signal of drought.

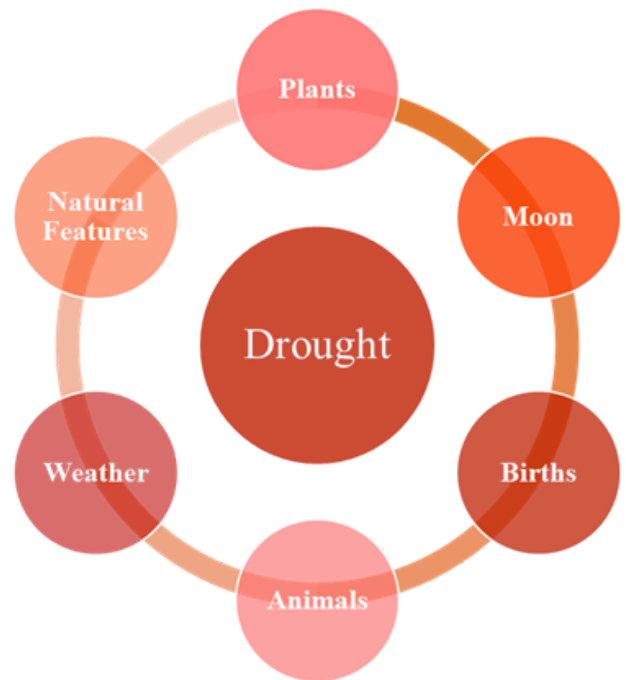


Figure 2: Indicators used to predict droughts

The Focus group discussions suggest that abundant fruits (any of the above) are an indication that the gods would have provided alternative food in preparation of the coming drought, “when the land produces more fruits meaning we have been given fruits for a living” Chimanimani FGD Ward 22.

However, there is another different explanation which is more aligned to western logic. The thinking suggest that the abundance of fruits suggests the absence of wind which potentially damages the flowers before developing into fruits, “If you see the tree with many fruits, it is a sign that the season will be bad because the winds that brings water would have not blown towards our area” Chipinge FGD Ward 3.

While the community holds different explanations about the abundance of fruits, they concur on what it signifies, poor harvest.

5.3 The Moon

The position and angle of the moon is believed to signify the amount of rains to be received in the coming farming season. “...If the moon is tilted it would mean there are going to be poor rains and if the quarter moon is positioned upright, it means that the rains are going to be heavy” Chipinge FGD Ward 1.

Similarly, Siambombe, Mutale & Muzingili, (2018) studying IKS in Binga found that the angle/direction of the moon does not only predict the amount of rainfall to be received but also the change of a season.

They further observed that the changing direction and angle is usually observed around October and November when the rainy season is expected.



5.4 Births

The people in Chimanimani and Chipinge observe the births and the sexes of the children in the community. A year when more girls are born prior to the rainy season predicts a good harvest. According to the IKS, girls signify productivity therefore, when more girls are born it is associated with a good harvest.

“The birth of many girls in a year also shows that there is likely to be good rains in that year. Many girls signify that more children will also be born hence this has been used in our culture to predict the likelihood of having a good or bad season” Chipinge FGD Ward 3.

5.5 Animals

Both domestic and wild animals send important signals to the people of Chimanimani and Chipinge as much as weather indicators are concerned. The communities study their goats’ birth patterns, in a year where more female than male goats are born and it is an indication of a good season.

What did not come out clear are the measurement thresholds but these observations are made around August, two months prior to the farming season.

This gives the community of smallholder farmers adequate time to prepare for the coming season.

“As early as June and August the birth of many female goats is a sign of a good season, the birth of many male goats is a sign of a bad season. Many females symbolize that more food will be needed for children that will be born by these goats hence good rains should be received to produce enough food that will even last in the dry spell” Chimanimani FGD Ward 16.

The behavior of wild animals provides important clues about the food prospects of the coming season. The Mariti bird or Dendera (Ground Hornbill), according to local people produces a booming unique sound that is believed to signify the start of the rainy season. The pattern of its call gives indications of how the rainfall will be spread across the season.

“Mariti birds produce a sound that signifies rains. If they continue consecutively for one week or more it’s a sign that good rains are coming and will be evenly distributed throughout the season” Chimanimani FGD Ward 16.

The Ground Hornbill is found in Sub-Saharan countries and its call is associated with the start of rain in the rainy season. In areas where this specific type of bird is not found, communities rely on other birds which produce sounds signifying the start of the rainy season. Once communities hear these sounds land preparation begins in anticipation of good rains.

A chirruping bird known as Kuera/Gutukutu is considered an important bird that alerts the farmers of the coming of rainfall and usually this used to happen at the end of October each and every year, “... they produce a sound to welcome rains that we use to begin preparing our fields for the season” Chipinge FGD Ward 1.

Wild animals find their food within their habitat in the bush, however, it is uncommon for wild animals to encroach into the fields in search of food. This is another indicator used by the people of Chimanimani and Chipinge to predict the prospects of a farming season. “If fewer wild animals visit our field is another sign of good rains throughout the season. It is because they will be a lot of food in the wilderness which can sustain them during and after the rainy season” Chimanimani FGD Ward 22.

5.6 The Weather

The people in Chipinge and Chimanimani used to study the weather to predict the prospects of the coming farming season.

The first rains received in early September commonly known as “gukurahundi” in Shona was used as a benchmark to predict the possible amount of rainfall that season. The rains received in early September were used in comparison to the rains received towards the end of September or early October as stated by the elders in an FGD in Chimanimani ward 16 “...The rains that they receive in early September known as "gukurahundi" (chaff from sorghum or mafunde in shona) is the one that awakens them, then they go into their low lying field and dig a hall to check the depth of moisture. If they receive another rainfall end of September (roughly 25 September), they visit their low-lying fields again and if the depth of moisture surpasses the previous depth reached by the early rainfall received at the beginning of that month, this will ascertain them of good rainfall during the upcoming season”.

The occurrence of mist was also another important indicator of a good rainy season. “... if there is plenty of mist in the surrounding area, people would know that there is plenty of rainfall” Chimanimani FGD Ward 21. Conventionally, mist is described as the collection of small droplets of water suspended in the air. Therefore, it makes logical sense for the locals to believe that this points to sufficient rainfall.

Windy is another weather element that was used to predict weather conditions and prospects of a good harvest. The direction from which the windy blows signified an abundance of rainfall or lack thereof. However, there is appears to be differences from one community to the other in terms of which direction signifies what.

“If the wind follows the previously mentioned anti-clockwise direction, we are getting accurate results of good rainfall. If winds follow the clockwise direction we are still getting accurate weather predictions of poor rains or possible draught” Chimanimani FGD Ward 22.

“...also the direction of the wind is used to signify weather. If the wind blows eastwards then there is going to be plenty of rains” Chipinge FGD Ward 1.

“When winds persistently blow from the North to the South, it is a sign of good rains” Chipinge FGD Ward 3.

In Chimanimani ward 22 good rains are said to be signified by winds blowing in the anti-clockwise direction. This description potentially refers to whirlwinds, suggesting that whirlwinds spinning in an anti-clockwise direction are an indicator of good rains and vice versa. On the other hand, in Chipinge Ward 1 good rains are signified by winds blowing eastwards, while in Ward 3 good rains are signified by wind blowing southwards from the north. It was not immediately clear why the directions differ from community to community. It was also unimportant to explore this question since this is a qualitative study whose essence was to establish the Indigenous Knowledge Systems as understood by those who live and experience it than to establish universal facts.

5.7 Lightning

Lightning signifies the coming of a drought. “If there is thunder and lightning, it means that there is bad rainfall and the harvests will be bad. If it is pouring silently, the rainfall will be good” Chimanimani FGD Ward 21.



5.8 Floods

Chimanimani and Chipinge have been affected by flush and riverine floods in recent history due to extreme weather conditions such as Cyclone Eline in 2000 and Cyclone Idai in 2019. These extreme weather events left a trail of infrastructural destruction and hundreds of thousands affected. Despite this history of flooding, there were not as many indigenous indicators as was the case with food security-related indicators.

The elders who participated in the study in Chimanimani ward 21 spoke of Mherepere birds. The Mherepere or Nyenganga signals normal to above normal rainfall and potentially floods. If the birds fly around in great numbers the community believes this to signal flooding and therefore people prepare to move to higher ground, "...if there are plenty of Mherepere birds and flies it showed that there is a plenty of rains and possibly flooding" Chimanimani FGD Ward 21. Other short-term indicators are presented in Table 1.

Hazard	Indicators	Behaviour
Flooding	Weather Patterns	<ul style="list-style-type: none"> • Sky turns gloomy and overcast • Weather unusually hot and humid/hot spells often rain • Strong wind blows from east to south
Flooding	Animal Behaviour	<ul style="list-style-type: none"> • Cattle become restless and stop eating grass • Cattle and or dogs wail continuously/ at night • Ants climb trees with eggs on their backs • Bees move around in clusters • Birds fly without destination • Increased number of flies and mosquitoes • Frogs call constantly • Crabs come into the house and courtyard
Flooding	Other	<ul style="list-style-type: none"> • Natural bending of trees • New leaves of trees fall on the ground • Muddy smell on the wind

Table 1: Indigenous Knowledge Indicators for Floods for Chimanimani and Chipinge Districts

5.9 Other Hazards

According to the study, participants there are not common lions in Chimanimani particularly in the wards where the study was conducted, therefore if a Lion is seen or its footprints are found in the area it is an indicator of imminent attack or disaster. This indicator is contextual and may require further consultations to interpret the type of hazard it signifies. During the war of liberation sightings of a lion meant attack by the enemy “lions are rare animals, when you see them in our communities it is a sign that a disaster may befall us. It is mysterious to see lions or their footprints in our community. During the war, seeing a lion in our community was a sign that we will be attacked” Chimanimani FGD Ward 16. After the war, this indicator became less obvious hence the communities needed to consult with local spirit mediums who would provide details of what the warning was.

Spirit mediums would not only wait to be consulted, but they were also proactive and provided important warning information to the villagers' about weather changes including hazardous events. As recent as 2019 one spirit medium in Chimanimani is believed to have foretold the coming of COVID-19. Spirit mediums did not only pass warning information they go further to attempt to prevent or mitigate the effects of the hazard as stated by a participant from Chimanimani in ward 16 “Information on possible disaster or danger about to strike the community, everyone was supposed to be alerted then preparations of traditional vaccines for those with the expertise as a way of trying to counter the impacts of the disaster, especially of pandemics”.

According to study participants, this was the case with COVID-19 which was predicted a year prior to its discovery “In the case of the COVID-19 pandemic the spirit medium then took a wooden plate and placed it in a tree with herbs in order for the area to be spared of excessive loss from the pandemic after dreaming about it 2 years ago” Chipinge FGD Ward 1.



Image 8:Community members sort through the rubble and damage left by Cyclone Idai in Ngangu township, Chimanimani, Zimbabwe. 23 March 2019

Table 2: Summary of Indicators and the attached meanings

Hazard/ Phenomena	Indicator	Behavior	Action by Community Members
Good Harvest/ Season	Mutondo (Julbernardia globiflora) and Mukamba (Pod mahogany)	Regeneration of lush green, healthy dense leaves	Be prepared for a good farming season/Aim for maximum productivity
	Muuyu (Baobab).	Quick regeneration of leaves	Be prepared for a good farming season/Aim for maximum productivity
	The Moon	On an upright position	Be prepared for a good farming season/Aim for maximum productivity
	Births	The birth of more girls than boys	Be prepared for a good farming season/Aim for maximum productivity
	Goats	Birth of more female goats	Be prepared for a good farming season/Aim for maximum productivity
	Mariti bird or Dendera (Ground Hornbill),	Continuous Unique sound for one week means imminent evenly distributed rainfall across the season	Be prepared for a good farming season/Aim for maximum productivity
	Kuera/Gutukutu	Produces a sound welcoming the rains	Prepare the fields for farming the season
	Mist	Occurrence of Mist signifies good rains	Prepare the fields for farming the season

Table 2: Summary of Indicators and the attached meanings

	Wind	Direction ² (varies from community to community) predicts good/poor rains	Prepare accordingly
Drought	Mazhanje, Nyii, Mutsikiri, Mauyu, Chakata, Mango and Shuma	Abundance of Fruits	Prepare alternative sources of food
	The Moon	Tilted position	Prepare alternative sources of food
	Wild Animals	Frequent visit to the fields	Low productivity; preserve food
	September Rains	If the amount of rain received in early September is more than the rainfall received in late September or early October this signifies below normal rainfall	Prepare for a poor farming season
Floods	Mherepere/Nyeng anyega	Flying in great numbers predicts above normal rainfall	Prepare to go to higher ground in case of flooding
Other Hazards	Lion	Sightings of Lion/s or Its <u>foot prints</u>	Prepare for an attack or an emergency. Consult with spirit mediums for specific details of the impending hazardous event
	Spirit Mediums	Dream/Foretell unfortunate events	Spirit Mediums take or advise the community to take appropriate remedial action

6.0 Constraints to use of IKS

A few households, especially those that are led by the elderly who have knowledge of the indicators mentioned above are still using IKS as sources of information for their decisions making especially around farming activities. The generality of the population does not know or consider IKS to be a reliable source of information for important decision-making. In this study, we explored some of the factors that constrain the application of IKS within the context of the districts and wards under study. It emerged that the superiority of western knowledge systems, the conflict between IKS and Christian religion, few people have the knowledge and understanding of the indicators and lack of a policy framework to develop and promote the use of indigenous knowledge systems are some of the factors that stand limit the widespread application of IKS. These are explored in detail below:

6.1 Perceived Superiority of Western Knowledge Systems

At the core of this factor is the epistemological debate of how we know what we know. The respondents who participated in this study believe that Indigenous Knowledge Systems are despised in preference to western knowledge system which is considered to be scientific and accurate. The younger generation who are more accustomed to western knowledge systems including information technology have not been exposed to IKS, this lack of exposure coupled with the education system which was deliberately designed to undermine local cultural, values, and knowledge systems during colonial times have made it nearly impossible for the younger generation to accept IKS as an important source of information.

The three quotations below summarize study participants' views on this constraint.

“Rejection and poor acceptance of the information from IKS by the current generation is altering the smooth flow of the warning on hazards and risks” Chimanimani FGD Ward 22.

“Communicating the warning and alerting potential risks from the IKS is now being heavily criticized and rejected as fake and produces false predictions” Chimanimani FGD Ward 22.

“The coming of whites taught these children to abandon their culture hence it is difficult to apply them. The younger generation does not believe also due to education in part also due to the increased use of technology” Chipinge FGD Ward 1



Image 9: Felistas Rungano (18), her house was swept away during Cyclone Idai, Chimanimani Chinamira Village Ward 17

6.2 IKS religion conflict

Over 80% of Zimbabwe's population is believed to be Christian[1]. Christian values go against some of the elements of IKS such as consulting the spirit mediums, which are considered evil from a Christian perspective. Indigenous knowledge relied on appeasement of the spirits through ceremonies such as rainmaking, "In the case of a drought, the community leaders then cook beer to ask for rain from the Supreme Being" Chipinge FGD Ward 1. Siambombe et al., (2018) argue that due to the abandonment of cultural and traditional practices for Christianity, such practices have been malnourished and gradually decaying. This argument resonates with the views of those who took part in this study.

"Due to the proliferation of religion, IKS is in conflict with what religions believe. It is regarded as demonic, satanic, and ungodly hence application becomes difficult" Chipinge FGD Ward 1.

"They are regarded as evil acts. Whenever we discuss about rain making ceremony young generations refer them to devil acts" Chipinge FGD Ward 3.

[1]International Religious Freedom Report 2007

6.3 Knowledge Monopoly

"The information is reserved for a select few that is the elite among the people. Those in the Chief's lineage have access to this information because they want to maintain dominance" Chipinge FGD Ward 1.

This assertion by community members resonates with Maunganidze (2016) who argues that knowledgeable people often ring-fence their expertise or died without transferring it to the next generation. This suggests that while there are exogenous factors that hinder and constrain the application of indigenous knowledge systems there are also endogenous factors that threaten its existence even.

How indigenous knowledge is learnt, stored, and transferred has huge implications for its future existence. The elders who took part in this study expressed concern over the practices of some of the custodians of the IKS. For example, it was stated during a focus group discussion in Chipinge ward 1 that "...some of the spirit mediums are now lying for self-gain and for being popular and get rewards like livestock from the people hence inducing doubt among the people". The previous quotation speaks to the commodification of indigenous knowledge systems which in part is transforming IKS from being a common good to an individual capability through which one must benefit. This has adverse effects on the perseveration and transfer of indigenous knowledge systems.

6.4 Lack of policy framework for IKS implementation

There is near consensus on the importance of indigenous knowledge systems, especially in the wake of climate change. Local people have been adapting to changing environmental and climatic conditions. This is giving rise to the idea that indigenous knowledge could potentially enhance the adaptive capacity of local people and mitigate the devastating impacts of climate change. Despite this consensus, no policy frameworks exist to enhance teaching and learning, use and institutionalization of indigenous knowledge.

All these factors do not favor widespread application of the indigenous knowledge system, concerted efforts will be required from state-actors in terms of developing policy frameworks, the academia in terms of documenting and testing the accuracy of the predictors and practitioners need to work closely with community members in applying the knowledge systems.

7.0 Indigenous Early Warning Indicators and Potential Application

Most importantly, this information is easily visible and simply disseminated among rural people, without any special equipment. For this reason, it would be most widely applicable and can be monitored near people's homes, such as those relating to animal behavior (ants climbing trees with their eggs). This would also put women at the centre of their own warning system and might act as a trigger for them to ask their husbands for more information about flags or radio transmissions.

Timing is crucial. The devastating Cyclone Idai occurred in most places of Chipinge and Chimanimani Districts in the middle of the night; indicators which only manifest a few hours before hand would be missed if people have already gone to bed. What is fascinating about these indicators is that many especially those relating to animals, apparently give a good lead time for preparation before what is essentially a rapid-onset disaster.

“We take notice of continuous crying of the dogs, increase of flies and mosquitoes, movement of ants, hot and humid weather. These signs occur 5-7 days earlier.” Traditional leader

“The dogs had been howling for four days before the flood hit in 2019.” Headman

Water temperature in springs, by comparison, is usually noticed only 6 to 7 hours before a cyclone hits or sometimes 24 hours before a particularly severe one. Even this, in daylight, gives reasonable time to bury important papers and valuables, take livestock to a high place, store dry food and clean water from springs for post-disaster period, strengthen houses and secure equipment and more to a shelter or strong house where possible

8.0 Indigenous Early Warning Indicators and Potential Application

We must ask why so many people saw the natural warning signs before the March 2019 Cyclone Idai disaster, yet were caught unprepared. Admittedly, those currently giving the information obviously survived and some indeed took precautions.

Currently, there is less inclination to travel far if a disaster is imminent (especially for those who had the worst experiences of previous disasters such as Cyclone Idai). Many people who were interviewed, however, explained that they have a hierarchy of preparedness strategies which usually include seeking a cyclone shelter as a last resort. This is often too late. Overall, there seems to be a disregard in many quarters for local knowledge which is perceived as old-fashioned and superstitious. If the latter was more organized and incorporated into a true “system” then possibly it would be perceived more seriously.

More research is needed to establish exhaustively the reasons for ignoring warnings that may relate to religious and traditional beliefs but sometimes are for practical reasons. A local Early Warning System could be a possible focus for increased cooperation, which would also work towards raising collective consciousness and empowerment for the poor.

Previous research has also discovered that appropriate communication and local participation are crucial factors that can dramatically affect the success of an Early Warning System (Twig, 2003). At-risk communities are more likely to respond to a system which is based on their own perceptions, needs and in which they play a central role. Locally developed Indigenous Knowledge is a good basis for building up a participatory system and one which has been used in Sub-Saharan Africa-albeit in the context of monitoring slow onset emergencies such as drought (ActionAid, 2002).



Image 10: Men salvage property from one of the many houses in the area damaged by cyclone Idai. Ngangu township Chimanimani.

9.0 Conclusions and Recommendations

With an increasing occurrence of natural disasters such as Cyclones and Drought, a growing young population with less experience of major disasters, we cannot afford to ignore any potential low-cost strategies which might improve survival and mitigate property and human life losses. Perhaps the aim should be to seek the “best of both worlds” just as modern and traditional medicine can jointly increase appropriate treatment options, we need to explore whether, certain combinations of the best scientific indicators can offer a more appropriate, reliable, and comprehensive Early Warning System for vulnerable rural people of Chimanimani and Chipinge Districts.

To move forward more anecdotal evidence should be compiled, with particular emphasis on the lead time, availability, and perceived reliability in different disasters. Selected Early Warning Indicators should then be monitored in future when disasters threaten and occur. If found reliable and effective, these could be incorporated into Non-Governmental Organizations and government programmes and Disaster Risk Reduction committees training both District and Ward levels through Community Based Disaster Risk Management (CBDRM) approach. Ongoing development programmes could adapt to support the process; for example, forestry and livestock programmes in Chimanimani and Chipinge Districts could include suitable species which play a part in Early Warning, survival, and recovery.

Most importantly, vulnerable people should be central to the process, not only in information gathering but in management. The process could be empowering for older people and for women, whose specialist knowledge would be important. Civil Protection Committees and Disaster Risk Reduction technical working groups in different districts could have responsibility for monitoring the local signs at certain times of the year and communicating the information in an appropriate manner.

To make a sustainable impact on vulnerability, however, it is evident that, such activities must be combined with increased government responsibility for protective infrastructure and measures for rights-based social change to protect and empower the most vulnerable. In Chimanimani and Chipinge Districts this has proved to be a real challenge, since many political figures, including those from the local government fraternity, have an interest in preserving the status quo. International Non-Governmental Organizations (most of which have policies to promote the involvement of the poor in project management) could play an important role, through their local partners, with a combination of action and advocacy.

Such work will be difficult since it involves a variety of stakeholders with very different interests, but it may well be that locally relevant Early Warning System is a useful focus on which to base such a process, which can then address other social phenomena. The study shows that there is no documentation of Indigenous Knowledge Systems that could be used to predict multi-hazards in Chimanimani. The information is available in form of Oral Tradition which makes it very difficult to rely on it since the primary sources are always changing. The study recommends that a similar study as this be carried out comprehensively to cover other wards that were not targeted.



The study reveals that, in both Chimanimani and Chipinge Districts, there is no integrated and synergistic relationship that exists between Indigenous Knowledge and Scientific Knowledge. This resulted in the two playing an antagonistic role against each other instead of complimenting each other. The study has recommended a framework for integrating Indigenous Knowledge and Scientific Knowledge Systems that plays complementary role to each other.

There is significant work yet to be done at the policy level. Whilst the IKS debate is part of the systemic agenda in Zimbabwe it is yet to reach the decision agenda level, despite consensus on the importance and potential of IKS. It is therefore recommended that Action Aid and like-minded organizations use their advocacy capacity to lobby state actors to put the IKS on their agenda and formulate national-level policies that not only regulate but encourage the learning and application of indigenous knowledge systems.

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