# The disappearing generation and climate change: evidence from Zimbabwe


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## Abstract

The passing on of key elderly members of communities is presenting new challenges on the well-being of the natural environment as their disappearance signifies the end of Indigenous Knowledge that had protected the ecological environment. Using 60 in-depth interviews situated in 2 rural settlements in the Shamva District of Zimbabwe, complemented by documents on climate change literature, the article demonstrates that the dying of elderly community members is contributing to climate change. With unprecedented levels of migration globally in the absence of Indigenous Knowledge transfer, the continued survival of this important body of knowledge is seriously threatened and this is also greatly contributing to climate change. An end to the free-market economy has been proposed as a solution to address the global problem of climate change. However, the inclusion of Indigenous Knowledge into the education curriculum, including its digitalisation, may go a long way in climate change adaptation and mitigation.



## Keywords

climate change, Indigenous Knowledge, old generation, rural communities, Zimbabwe


## Introduction

The old generation, which in this context refers to the elderly members of the community who were born before 1960, is dying across the globe. In this study, the term old generation will be used synonymously with the disappearing generation. For many communities, the ageing of farmers raises the question, *who will tend the farm* (Rigg et al., 2020). The key community elders, particularly in rural areas, are the sources of Indigenous Knowledge. This has been demonstrated in studies of a more functional bent, for example in China, where reports of ageing farmers are well documented (Guo et al., 2015). Even in African countries such as Malawi, the dying of key community members is presenting worrying challenges related to problems of both climate change and general livelihoods

(Lindsjö et al., 2021). The dying of key elderly members in different communities is also well documented in Botswana (Aina, 2007). In these contexts, there is a growing concern about the extinction of Indigenous Knowledge, which is an important body of knowledge in the mitigation and adaptation to climate change. The challenge is that the custodians of this information are dying before transferring this knowledge to the surviving generation (Parry et al., 2007). The rapid rural-urban migration by the youths to look for better economic opportunities in urban areas has led to considerable reductions in potential future farmers. This shows a great loss of rural human and social capital as the key elders are left in the rural areas in the absence of the younger generation who are no longer available to receive Indigenous Knowledge teachings from their key elders. In these circumstances, Indigenous Knowledge is disappearing when the key community elders die. Thus, negative implications on resource use and management are already on the horizon with increasing volatilities of the weather in Africa (Douglas et al., 2008). Globally, increases in temperature from 0.5°C to 0.7°C since the twentieth century have been observed (Juana et al., 2013, p. 122), indicating undeniable evidence of a changing climate; the reason why the nations of the world came together at the 1992 Earth Summit that was held in Rio de Janeiro was to discuss issues related to the role of the natural environment in Sustainable Development (Palmer, 1992). In the absence of Indigenous Knowledge skills transfer, the ecological environment continues to suffer multiple ills given that current mitigation and adaptation strategies developed from capitalist technologies, for example carbon markets (Stuart et al., 2019), will not generate sustainable solutions to the problem of climate change. This means that if urgent action like calling for zero greenhouse gas emissions into the atmosphere is not taken, then everyone all over the globe stands to *sink or swim* (Arsel, 2019). Past efforts at harnessing capitalist methods of protecting the environment are failing to deliver the desired solutions as allowing "the market mechanism to be sole director of the fate of human beings and their natural environment indeed would result in the demolition of society" (Polanyi, 2001, p. 76). Proposed solutions to climate change, including the promotion of carbon markets, represent a further expansion of global capitalism. However, evidence demonstrates that climate change is more than the politics of capitalism (Chakrabarty, 2017). Ideas challenging capitalism as the sole cause of climate change, including those originating from the non-western world, can similarly offer sustainable solutions to the problem of climate change (Schlosberg & Collins, 2014). Thus, integrating Indigenous Knowledge into mainstream discussions on climate change mitigation and adaptation can add value to the efforts of fighting global ecological destabilisation (Nyong et al., 2006). It may be plausible "to bring community and environment back into harmony" (Leach et al., 1997, p. 8) through formulating and applying "policies that bring human numbers and life-styles into balance with nature's capacity" through "the rediscovery and rebuilding of traditional, collective resource management

institutions, or their replacement by new ones, such as the community management plans and village environmental committees so often associated with community-based sustainable development strategies" (Leach et al., 1997, p. 8).

African rural communities have been using meteorological Indigenous Knowledge to protect their natural environments to guard against food shortages (Mawere, 2013). In addition, food systems and food security have also been enhanced by, among others, post-harvest practices and technologies like drying and granaries (Mararike, 2011). While this knowledge has been important, also tacit is the "death of key elders and the resulting extinction of their collective wisdom" (Lalonde, 1991, p. 5). This presents serious constraints to the long-term survival of Indigenous Knowledge (Lalonde, 1991). Thus, the challenge of preserving Indigenous Knowledge "is maintaining this information base in the face of the demise of older generations and the current wider scale of interactions of communities with other cultures" (Ziervogel & Opere, 2010, p. 7).

The passing on of this Indigenous Knowledge to the younger generation by the elders had traditionally been done through story-telling, rituals, myths and taboos (Ajayi & Mafongoya, 2017; Chanza & Mafongoya, 2017; Christopher et al., 2006; Mapara, 2009). This knowledge had solely depended on social memory in the absence of a formal documentation system (Parry et al., 2007), and this is presenting new challenges as this knowledge is disappearing given that the custodians are dying before passing it on to the surviving generation.

Indigenous Knowledge, together with western meteorological knowledge, may act as important resources for a considerable array of researchers and concerned stakeholders. In Tanzania and Benin, a pilot project entitled *Integrating Meteorological and Indigenous Knowledge-based Seasonal Climate Forecasts for the Agricultural Sector*, combining Indigenous and western knowledge systems in climate observation, has improved general livelihoods (Ziervogel & Opere, 2010). In these countries, rural livelihoods were improved through the development of climate-related information for farmers using both western and Indigenous Knowledge to alert farmers on the state of weather and climate, and these arrangements have improved the food security situation of the locals (Ziervogel & Opere, 2010).

Noticeably, the interaction of Indigenous Knowledge Systems and ecosystems is fundamental, and resultantly, discussions related to climate politics should overlap in many ways with the ageing generation's concerns. As the depletion of the ozone layer becomes apparent with perpetually greater force, these two debates will increasingly become attached. This article explores how the loss of Indigenous Knowledge, through the passing on of the elderly members of the communities in the absence of Indigenous Knowledge transfer, is contributing to climate change.

## Evidence of climate change

There is abundant evidence that the climate has changed and is still changing and the lives of human beings and that of nature are in danger. On average, world surface temperatures have increased by approximately 0.6°C since the 1950s and from the year 2001, a 1.4°C temperature increase has been recognised (Parry et al., 2007). On the African continent, evidence of climate change is apparent with the weather becoming increasingly volatile (Douglas et al., 2008). Decreases in rainfall, temperature increases alongside warming of approximately 0.7°C over most of the continent during the twentieth century, changes in the patterns of precipitation, rises in sea levels, and increasing frequency of droughts and floods are some of the major signs of climate change that have been observed on the African continent (Juana et al., 2013). As a result of this changing climate, it has, thus, been observed that approximately 370 million people in Africa may experience water shortages by 2025 (Arnell, 2004).

In Zimbabwe, the 1991–1992 annual precipitation was 10% less than the previous 1990–1991 agricultural rainy season, and this was mainly attributed to the phenomenon of El Niño Southern Oscillation (Glantz, 1992). Temporal and altitudinal variations in rainfall patterns, alongside acute shifts in the onset of rains, and increases in dry spells have become common including unusual warming conditions (Mavhura, 2016). The intensity and frequency of extreme weather events ranging from droughts, floods and cyclones are increasingly becoming common, with far-reaching consequences including sharp declines in agricultural productivity and livestock populations (Rukarwa & Hasegawa, 2015). Between 1980 and 1989, hydrological disasters were not common in Zimbabwe (Swain et al., 2011). From 1990 to 1999, only one hydrological disaster was recorded, but from 2000 to 2010, more than five hydrological disasters were recorded (Swain et al., 2011). The occurrence of floods that have affected places like the Gwayi-Shangani catchment area (Manyeruke et al., 2013) and floods that have become a major occurrence in Muzarabani have been observed (Mavhura et al., 2017). More recently, there has been the devastating Cyclone Idai in 2019 that affected Buhera, Chimanimani and Chipinge districts (Mavhura, 2020).

## The old generation and environmental protection

In many parts of the world, particularly in Africa, senior citizens play significant roles in the livelihoods and well-being of societies. They are, thus, essential players in the well-being of ecosystems, which means their absence is bound to generate ecological challenges. They are usually the people whose knowledge of weather and climate patterns have been enhanced by careful and long-term observations of meteorological patterns over many years and therefore act as sources of Indigenous Knowledge (Chanza & Mafongoya, 2017; Mapara, 2009). However, experience with western-style scientific knowledge in the mitigation

and adaptation to climate change is cautioning the world that relying only on this body of knowledge without incorporating Indigenous Knowledge is becoming increasingly unsafe as immediate solutions to the climate change problem are not instantaneously being generated and everyone stands to *sink or swim* (Arsel, 2019).

The elderly members of communities are important pillars in the protection and keeping of Indigenous Knowledge. This knowledge is important not only in the cultural settings in which it is generated but also in how it complements modern scientific knowledge in the protection of ecological environments. This knowledge set is based on information accumulated over generations and is inherently connected to specific environmental localities (Woodley, 1991).

Senior citizens have provided the foundation upon which environment–society interactions had relied on for generations. This has been expressed through their ability to influence decision-making in their habitat-specific residential confines. The elderly members of communities are well-equipped with environmental knowledge related to advanced techniques like zero-tillage and mulching (Schafer, 1989); traditional techniques that have been known to stabilise soil temperatures (Osunade, 1994) and for carbon retention in the soil (Schafer, 1989).

In addition, key community elders are knowledgeable in the practice of agroforestry, a rational agricultural practice that specialises in the production of both food crops and forests, capable of acting as carbon sinks in the long run (Adesina et al., 1999). This agricultural practice has been regarded as particularly valuable in the addition of organic manure to the soil. Indigenous Knowledge is, thus, important in environmental management. The incorporation of such knowledge into the pool of climate science literature will definitely contribute to safeguarding both the current and future generations from the devastating effects of climate change.

Community key elders are a vital source of information related to early warning systems in the forecasting of disastrous events. The senior citizens are reservoirs of a wealth of localised knowledge useful in the prediction of weather and climate patterns. Similarly, farmers have been developing complicated, but comprehensive systems of gathering information related to predicting weather behaviour, thus enabling them to make informed decisions, which has enabled them to make their cropping decisions based on their knowledge of traditional weather forecasting (Nyong et al., 2006). This is an indication that Indigenous Knowledge involves an integrated body of knowledge which was created through years of careful observations and experiences of interactions between humans and nature (Mapara, 2009; Risiro et al., 2012). This knowledge is empirical as it is created from observed truths with both temporal and spatial dimensions considering that it is continually adapted and adjusted to suit certain socio-economic and ecological changes (Mapara, 2009). Indigenous Knowledge, thus,

serves the twofold purposes of greenhouse gas emissions reduction while also acting as sources of carbon absorption. The discouragement of community people from cutting down trees in certain sacred areas, through a common shared understanding, was particularly helpful in this regard.

Notwithstanding, the elderly members of communities are dying without transferring this Indigenous Knowledge to the surviving generation. This situation is placing the preservation of bio-diversity in an uncertain position. Of course, attempts have been made to establish gene banks, through the World Bank, to preserve information on genes for local varieties or Indigenous species (Nyong et al., 2006), but these attempts, including a number of studies on natural resources management, have "not attracted adequate attention in the global race for environmental protection" (Akinwale, 2012, p. 5). Though the United Nations Educational, Scientific and Cultural Organisation's Man and the Biosphere programmes, including the establishment of World Heritage Sites by the World Heritage Committee, have been effected,

a key challenge yet to be realised in relation to Planetary Stewardship and Earth System Governance is to combine emergence of multi-lateral institutions and regime formation with mechanisms for incorporating biosphere understanding and capacity of responding to ecosystem dynamics into such efforts. (Akinwale, 2012, p. 6)

Even "the measures agreed upon at local, national and international levels to mitigate the negative effects of climate change, such as the Kyoto Protocol, have . . . caused the destruction of millions of hectares of forests . . . " (Magni, 2017, p. 442) as a result of the setting up of oil palm plantations. This makes the contribution of this article absolutely relevant as this study would help policy makers to reconsider other forms of Indigenous Knowledge transmission that include the digitalisation of local knowledge by the Indigenous peoples themselves using their own language to retain its originality, thus helping in the preservation of this knowledge accurately. This is because the storing of genetic traits without preserving the knowledge on how these should be implemented is definitely a futile exercise (Warren, 1991). Of course, nomadic herders in East and North Africa have been able to reduce their cattle herds in favour of goats during drought periods, indicating a thorough understanding, as far as the protection of the natural environment was concerned (Oba, 1997), but this knowledge is disappearing with the death of key elders in different communities in the absence of proper transfer to those who are surviving. It is this understanding that reminds us that the old generation, with a thorough rural knowledge background, is an indispensable human capital resource as this generation had been able to create morally accepted interactions within rural communities. Community members have been able to make holistic decision-making processes in the protection of the environment in harmony as opposing

such decisions could lead to isolation of other members by the community (Nyong et al., 2006). Many of the environmental ideas have increasingly complemented the western style ideas on environmental protection though initially regarded as primitive (Nyong et al., 2006). The old generation has been able to create harmonious relations that were not aimed at cultivating exploitative relations, sharing similar principles with the Sustainable Development Framework that emphasised the 3Es: economy, equity and environment (Davis & Ebbe, 1995).

The argument of this article borrows its support from the early community-based development consensus based on assumptions of common interests among members of a specific social group, particularly in the area of human–nature interactions (Leach et al., 1997). Here, the community refers to a local administrative unit such as a village, a ward or even a district, or ethnic or cultural groups (Leach et al., 1997). Such groups are viewed as moderately homogeneous, sharing certain characteristics that include, but not limited to, a common neighbourhood, language, beliefs and social norms. This development narrative assumes that local communities are entirely responsible for protecting their local environment, and in cases where the community could have destabilised it, the society concerned had the potential to restore and manage it sustainably (Leach et al., 1997). The framework chosen for this study is highly relevant to the above assumptions since traditional leaders, elders and healers of a given community were known to be the custodians of Indigenous Knowledge, which has been indispensable in environmental protection (Mapara, 2009).

Closely aligned to these assumptions are the notions of early anthropology and sociology, which both view society as a coherent unit united by common interests, and mutual interactions and beliefs that shaped it into moral communities (Durkheim, 1895). These interrelated notions of structural functionalism had a strong impact on this study as the structure of society had been known to drive dos and don'ts, which unquestionably governed the behaviour of the individuals concerned while maintaining the social order (Leach et al., 1997). Resultantly, communities were meshed functionally to achieve society's needs and similar human–nature interactions existed in harmony (Leach et al., 1997). However, the death of key community elders in the rural areas in contexts of rural-urban migration is destructive to Indigenous Knowledge maintenance as the rural areas are being left with only the aged, who are passing on before imparting Indigenous Knowledge to the surviving generation.

## Debates on causes and effects of climate change

There are contrasting, but often coinciding, explanations for the causes and consequences of the climate crisis and for the course of appropriate climate action. On one side of the argument is the corporate-driven technological narratives (Huff, 2023). Here, capitalism is seen as a self-correcting system

through generating uninhibited reproduction of capital and concurrently producing effective adaptation and mitigation solutions to the problem. While the concept of corporate capitalism could have generated ecological change, scholars such as Borras et al. (2022) regard it as purely accidental and similarly argue that the problems generated could be reversed if the right approaches are adopted. The scientific solutions fundamentally attached to these narratives are essentially concerned with realising competence in the system of global capitalism through close monitoring of the Anthropocene to generate slow warming of the planet (Pearce, 2019). The view infers technical aptitude at the expense of both human and environmental justice (Albert, 2020). This narrative, thus, emphasises unlimited productions of capital alongside technology that is meant to fix problems of global warming, for example, through the setting up of monocrop plantations to act as carbon sinks (Huff, 2023).

Another perspective is the climate justice narrative which argues that all forms of injustice are prevalent and similarly at the root of climate chaos (Boyce, 2018). Supporters of this narrative call for the creation of justice for sustainability or *just transition* (Swilling, 2019). The perspective reveals an assortment of socially related injustices concerned with knowledge, procedure, distribution and correctives. Addressing these injustices is fundamental in solving the problem of climate change (Dryzek et al., 2011). Here, climate change extends to issues of inequality and injustice (Lynch et al., 2019) that are dominant in contemporary societies.

A third stream of the argument associates the causes and effects of climate change to structural transformation narratives. This view considers a heavy dependence on fossil fuels in the survival of contemporary economies as the greatest challenge (Borras et al., 2022). These capitalist activities produce forms of wealth that are unevenly distributed across time and space. To fix these challenges, the view advances the fundamental changes in the relations of production through various forms of technologies and state welfare (Ajl, 2021). The opinion presents typical fundamentals of a thorough visualisation of a *green new deal* to restructure the global economy.

Another strand of the argument links climate change to climate emergency narratives. Anderson (2017) argues that ecological damage has already been done and similarly, disaster is imminent and that this validates rare, violent and occasionally unconstitutional procedures where self-governing command would overlook people's rights, activities and awareness (Paprocki, 2021). This view points to rising sea levels, heat waves, droughts, thawing permafrost and glacier melting, with the possibility of the eventual downfall of civilisation (Skrimshire, 2010).

While these capitalist-related perspectives have been highly valued in causing climate chaos, little work has been done on how the loss of Indigenous

Knowledge, through the death of elderly members of communities before imparting this knowledge to the surviving generation, has contributed to ecological destabilisation. This article argues that the waning of Indigenous Knowledge being realised through the death of the elderly members of communities should be factored into the debates on climate change.

## Field sites and methods

The investigational basis for this study rests on information-gathering carried out in two villages in the Mashonaland Central Province, Zimbabwe, between 2017 and 2020. These villages were Bushu Communal Area and Mupfurudzi-Dombojena Resettlement Scheme, all in the Shamva District of Zimbabwe (Figure 1).

Bushu Communal Area is a long-standing, agricultural village, whose establishment dates back to 1916, lying approximately 90 km northeast of Zimbabwe's capital, Harare (Chiba, 2019, 2023; Chiba & Thebe, 2022). In this context, the Bushu Village being referred to is the one located about 9 km to the north of Shamva Growth Point, with the Zambayamba Hill Range, which runs from the east to the west, to the north, and the Kajakata Hills, which forms the border with Kambiri Village, to the south (Chiba, 2019). To the west, it borders the Nyamahumbe Resettlement Scheme, while to the east, it is bordered by the Shamva-Madziwa Highway, which provides a gateway to the Madziwa Mine and Teachers' College Mupfurudzi-Dombojena Resettlement Scheme is a relatively newly established village that began its life in 2004 at the behest of the implementation of the Fast-Track Land Reform Programme that started off in 2000 in Zimbabwe. This Fast-Track village is bordered by Gono and Kanyemba Villages to the south and by Mupfurudzi River to the north, separating it from other resettlement schemes like Mutoramhepo, Mupedzanhamo and Murindagomo, among others. To the east, it is bordered by the Princip Irrigation Scheme. The choice of these two study villages is an extension of prior experience in working with these communities between 2013 and 2014 during a period of graduate research. Mupfurudzi-Dombojena Resettlement Scheme was chosen, not for comparative purposes but for triangulating data since a lot of people with diverse backgrounds had converged in this area (Matondi, 2012). This implied that diversified systems of Indigenous Knowledge from different communities across the country could be available for researching.

Prior to fieldwork engagement, ethics approval was received from the University of Pretoria, the Office of the Cabinet and President in Bindura in July 2017. After the Office of the President and Cabinet in Bindura, ethics approval was similarly obtained at the district level. The chief and the respective heads of the two villages forming the field-sites in this study were also approached to get their approval to collect data. After this, data collection began. In gathering data, a purposive sampling technique was employed and male and female respondents,

who were born before 1960, were selected. Youths who were above the age of 18 were also purposively selected to survey their views on Indigenous Knowledge and climate change. This was a case study approach in which participants were visited, on several occasions to elicit information regarding Indigenous Knowledge transfer and climate change. The study respondents were asked for informed consent before in-depth interviews were conducted. Their role in the study was also explained and they were told that the findings of the study would be published in as an article with pseudonyms replacing their names to hide the identities of the research participants.

Initially, the first fieldwork trip was conducted during the reconnaissance phase with 15 households from each study site, where in-depth interviews were conducted between 2017 and 2020. After this phase, an additional 30 participants were added to get diversified opinions on the impact of the dying of the elderly community members on climate change in the absence of Indigenous Knowledge transfer to the surviving generation. Table 1 shows the age cohort and sex of the study participants.

Table 1. Fieldwork investigation procedures and data gathering etiquette.

| Age | *N* | Total |
|---|---|---|
| Above 60 years | 32 | **32** |
| 18–59 years | 28 | **28** |
| **Total** | **60** | **60** |
| Sex | *N* | Total |
| Male | 30 | **30** |
| Female | 30 | **30** |
| **Total** | **60** | **60** |

Table 1 shows that 30 males and 30 females were chosen to participate in the study, a total of 60 participants. To complement in-depth interviews, documents that cross-examined a wide range of climate science literature were analysed and these gave voice and meaning to the ecological literature. Data were recorded as field notes and then transcribed and translated to English. During analysis, data were broken into themes which then led to the compilation of this qualitative article.

## Results and discussion

*Meteorological Indigenous Knowledge held by community elderly members*

Fieldwork evidence demonstrated that the elderly members of the communities in Bushu and Mupfurudzi are rich sources of Indigenous Knowledge related to weather and climate. One of the research participants informed:

**Figure 1.** Bushu and Mupfurudzi, Shamva District, Zimbabwe (Surveyor General 2019, Harare).

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Indigenous knowledge is rich in terms of predicting the state of weather. There are multiple signs that we use to foretell the state of weather tomorrow, next week or even next month. For example, if the wind is blowing from the west to the east, it indicates the onset of rains. Additionally, the movement of stars from west to the east when the skies are clear indicates that rain will fall within three days. (Goremusandu, male, 72 years old)

Other forms of Indigenous Knowledge related to meteorology, stated by the research participants, included the heavy flowering of trees such as muzhanje (sugar plum tree) and muhacha (hissing tree) demonstrating a potential drought season. In addition, it was also stated that the germination of new leaves on particular plants like muuyu (baobab tree) was a sign of good rains. When the moon crescent faces downwards, it was stated that this indicated that rain will fall in the next 3 days and vice versa. In addition, it was stated that the appearance of red ants also indicates that good rains are coming. The first appearance of flocks

of sparrows is also a sign of good rains, as also is the continuous squeaking of certain animals like mbira (rock-rabbit).

### *Ways of transmitting Indigenous Knowledge to the surviving generation*

The evidence gathered during fieldwork demonstrated that a number of ways of transmitting Indigenous Knowledge to the surviving generation were used. The elderly members of the community also used riddles, songs, legends and myths to hand down this knowledge to the younger ones. It was demonstrated that young people who were getting into puberty were taught at the dare (men's meeting place for sharing ideas), in the case of boys, and in the dzimba dzekubikira (cooking huts), in the case of girls. In this regard, boys were taught by their grandfathers and uncles while girls were taught by their grandmothers and their maternal aunts.

### *The dying generation and climate change*

For developing economies, the dying of the elderly community members, who are the sources of Indigenous Knowledge in the protection and understanding of nature, is bound to have retroactive effects on the natural environment, certainly scoring environmental negativities. The death of the old generation, especially in the absence of Indigenous Knowledge transfer to the surviving generation, has often led to ecological disturbances by creating "problems like dilution and even extinction of vital Indigenous Knowledge" (Hangshing, 2023, p. 178).

Without the inclusion of other bodies of knowledge, such as Indigenous Knowledge, to climate science, evidence shows that attempts at safeguarding the Anthropocene from total annihilation cannot stand the effort (Chakrabarty, 2017; Chandler, 2020; Sutton, 2023). In-depth interviews carried out in Bushu and Mupfurudzi-Dombojena revealed that quite a number of people aged above 60 were dying. For the few surviving elderly community members interviewed, it was revealed that it is getting increasingly difficult to impart Indigenous Knowledge to the surviving generation, partly because of the absence of the youths in the rural areas since they spend most of their time in the urban areas in search of better economic livelihoods. Some of these elders like VaChidodo (male, 69 years old) showed that he knew a great deal about Indigenous Knowledge related to the protection of the natural forests, but his grandchildren were no longer living at the house since they had left for Bindura. VaChidodo informed,

I am just waiting here for my own death, but I have no one to give this Indigenous Knowledge to since my grandchildren have shunned the rural areas and now concentrating with city life. They only come here to attend funerals and that's their way of life.

Another way through which the waning of the old generation has contributed to climate change relates to the death of the old generation in the absence of passing on of the Indigenous Knowledge to the youths—the surviving generation. The absence of Indigenous Knowledge is presenting worrying challenges for the disappearing of this large body of knowledge that is capable of serving the Anthropocene from further warming and destabilisation. One elder commented,

The world has changed. In the past, our elders used to sit with us outside the cooking huts where we were taught survival skills including the knowledge of studying the behaviour of the weather. Nowadays, the situation has become absolutely different. We no longer have time to sit with our grandsons to impart our traditional knowledge to them and unfortunately, our generation is fast disappearing. The other reason stems from the negative attitude of the youth from harnessing this knowledge for the benefit of human-nature interactions. (Mbuya Chindanga, female, 67 years old)

As the old generation is failing to pass on their traditional Indigenous Knowledge to the surviving generation, the ecological environment is losing out. Forests and other related complements of the ecosystem are fast disappearing as the youths, through their money-making ventures, are engaging themselves in a complex modern livelihood. Some of these activities are being engineered by lack of knowledge with regard to the benefits of environmental protection. One of the youths informed,

There is no wrong in doing your own livelihood ventures as long as you are not stealing from anyone. The environment is a natural entity and even if we cut down these trees burning our bricks, the environment will just recover naturally. No one commanded the trees to be there. It was only God. So, even if we do our own activities, nothing is wrong as long as these will be meant for survival. (Tendai, male, 32 years old)

For an ecological environment that depends on the next generation for its protection, there is now little or no hope for inter-generational succession as youth have opted to leave the rural areas and opted to live in the comfort of urban zones. Young people are now engaged in city life. With the absence of young people in the rural areas, in conjunction with issues of limited health and aged care service provision as well as the negative attitude that youths have towards Indigenous Knowledge (Akinwale, 2012), there is growing concern for ageing rural families who are beginning to experience social isolation, poor health and reduced quality of life and who are seemingly making the choice to stay in the rural areas (Rigg et al., 2020).

With the disappearance of the old generation, the natural environment is facing destruction through income-generating activities, for example, chigweja (illegal gold panning). One of the research participants who was involved in chigweja informed,

I do not think it is bad to do mining activities even if the trees are destroyed. They grow naturally and when one is engaged in survival economic ventures, there is nothing bad. Worse, there are no formal jobs in the country. The only survival means is to engage oneself in self-driven projects. In my case, I pan for gold to survive. Protecting the trees is another issue. (Johannes, male, 34 years old)

Ignorance of Indigenous Knowledge in the protection of the natural environment has similarly been expressed through the indiscriminate cutting down of trees by those who are still in the rural areas fire the fires to cure tobacco during the drying process. It was evident that these livelihood ventures were being carried out due to lack of knowledge on the importance of Indigenous Knowledge in the protection of forests. One of the respondents thus informed,

I need to survive. I am a tobacco farmer who cannot afford to buy other fuel sources like coal to cure my tobacco. I, thus, use the trees around here to do this job of tobacco curing. Both my grandparents and parents died, but I do not remember occasions when they taught us about the science of forest conservation methods using the Indigenous Knowledge System. On my part, I need to survive and nothing else. (Gumborenzombe, male, 36 years old)

Owing to the death of the elderly members of the communities before imparting Indigenous Knowledge to the surviving generation, the study found that land is facing higher levels of degradation due to gold panning ventures. This has bred a lot of challenges on the natural environment. Resultantly, it was learnt that

The youngsters are no longer aware of the bad habits of disturbing the natural environment. Resultantly, we are always living in fear from the time of the onset of the rainy season till it ends. Year after year, incidences of cyclones are now common language. Even in this neighbourhood, some houses fall down once rains reach levels that are above normal. These things are happening in this neighbourhood. (Kanjanda, male, 64 years old)

The article has argued that climate change is intricately entangled with current social crises, particularly the dying of the elderly community members in a context where the transmission of Indigenous Knowledge is increasingly becoming difficult due to the desertion of the rural areas by the surviving generation, particularly youth. The elderly members of the communities are dying without transferring their Indigenous Knowledge that had been used to guard against climate change. How to deal with this challenge requires sophisticated analysis and action.

The study has shown that there are multiple forms of Indigenous Knowledge related to weather and climate held by key elderly community members. This information includes the heavy flowering of trees such as muzhanje and muhacha, which indicates a potential drought season, and the growth of new leaves on

particular plants like baobab signalling good rains. Interestingly, this knowledge had been transmitted to the younger generation through riddles, songs, legends and myths. These results are consistent with previous studies (Bhatasara & Mandizadza, 2014; Chanza & Mafongoya, 2017; Mapara, 2009; Mapfumo et al., 2015; Mubaya et al., 2017; Risiro et al., 2012).

In addition, evidence has shown that the elderly members of the rural communities in the Shamva District of Mashonaland Central Province, including traditional leaders, healers and other elders, are important sources of Indigenous Knowledge that is key in the protection and keeping in balance natural ecosystems. This knowledge is important not only in the cultural settings in which it is generated but also complements western scientific knowledge in the protection of ecological environments. The knowledge is based on observations of weather patterns and is inherently connected to specific environmental localities. It, thus, connects the locals directly to their immediate environment, enabling them to come up with powerful mitigation measures against environmental threats related to climate change (Woodley, 1991).

The old generation have provided the foundation upon which environment–society interaction has relied. This has been expressed through their ability to influence decision-making in their habitat-specific residential confines. The old generation has also been well equipped with environmental knowledge related to advanced soil management techniques like zero-tillage and mulching (Schafer, 1989). Such traditional techniques have been known to stabilise soil temperatures and guard against the spread of soil-related diseases (Osunade, 1994) and are techniques which have been known to keep carbon in the soil (Schafer, 1989).

However, with the dying of the elderly members of communities in the absence of Indigenous Knowledge transfer to the surviving generation, traditional practices that had been responsible for environmental protection are increasingly becoming less viable in the midst of an upcoming generation that has opted to survive in urban areas in search of better economic opportunities. In the past, well-managed forests, where deforestation of any kind was strictly prohibited, were carbon sinks and provided other benefits to the community, such as food and timber resources. This argument is well backed by earlier studies that have confirmed the importance of forests in the storing and sequestrating of carbon, including the disappearance of Indigenous Knowledge due to the ageing and death of the old generation in the absence of Indigenous Knowledge transfer (Christopher et al., 2006).

It has been demonstrated that Indigenous Knowledge is important in the protection of the natural environment; for example, the Mijikenda kaya forests, in Kenya, which are still being protected and are considered sacred (Githitho, 2016). However, Indigenous Knowledge transfer has solely depended on social memory in the absence of a formal documentation system (Parry et al., 2007).

Although a number of efforts have been made to digitise Indigenous Knowledge through the creation of large databases in countries such as New Guinea (Ray, 2023), including the incorporation of Indigenous Knowledge in formal schooling in regions such as Latin America (Magni, 2017), evidence demonstrates that "there is a gap between what people know on the ground of New Guinea plants and what is documented . . . about them in the international community" (Ray, 2023, p. 2). Despite these digitisation approaches undertaken to preserve Indigenous Knowledge, global communities like the Mapuche people of the Andes have stopped sharing their extensive Indigenous Knowledge of wild plants with the younger generations leading to the loss of this knowledge (Ray, 2023). Some of the reasons for this may relate to the continued under-recognition of Indigenous Knowledge at the international level (Magni, 2017). This is presenting new challenges as this knowledge needs proper documentation; for example, through the use of Indigenous Languages in its documentation from local key elders (Magni, 2017) to preserve its originality as the original sources of this knowledge are dying (Hangshing, 2023; Ray, 2023). A negative attitude towards this knowledge by the youths has also been recognised (Kakiso, 2023).

Thus, the usual link between communities and the natural environment has been detached. These observations have demonstrated that the early community-based development consensus that had been based on assumptions of common interests, among members of a specific social group, particularly in the area of human–nature interactions (Leach et al., 1997) is no longer functional. This is taking place as a result of the passing generation, which has always acted as the cement of human–nature relations through their Indigenous Knowledge teachings. These observations are reminiscent of the grand narratives that the dying of the elderly community members before transmitting this Indigenous knowledge to the surviving generation means the end of this knowledge (World Bank, 2016).

## Conclusion

The old generation has been an important part of human society as they have been the custodians of Indigenous Knowledge, which should complement western knowledge to enhance environmental well-being. The old generation had been playing the functional role of passing this knowledge to the surviving generation. Methods that have been used to pass on this knowledge followed different patterns such as various taboos and story-telling. However, the danger that faces modern society has to do with the rapid passing of this old generation in conditions where the surviving generation has not been oriented to this knowledge due to the need to look for better livelihood opportunities in urban areas, making it difficult for elders to pass on their Indigenous Knowledge to the surviving generation.

## Recommendations

This study recommends that national governments should promote the inclusion of Indigenous Knowledge in the education curriculum's existing subjects' right up to higher and tertiary education. National governments also need to digitalise Indigenous Knowledge through the introduction of edutainment, for example, producing plays or movies and modern songs on Indigenous Knowledge. In addition, efforts to document Indigenous Knowledge should be prioritised together with attempts to store, keep and broadcast Indigenous Knowledge to make it available to the surviving generation, researchers and scholars.

## Author's note

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## Glossary

chigweja illegal gold panning

dare men's meeting place for sharing ideas

dzimba dzekubikira cooking huts

mbira rock-rabbit

mbuya grandmother

muhacha hissing tree

muuyu baobab tree

muzhanje sugar plum tree

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