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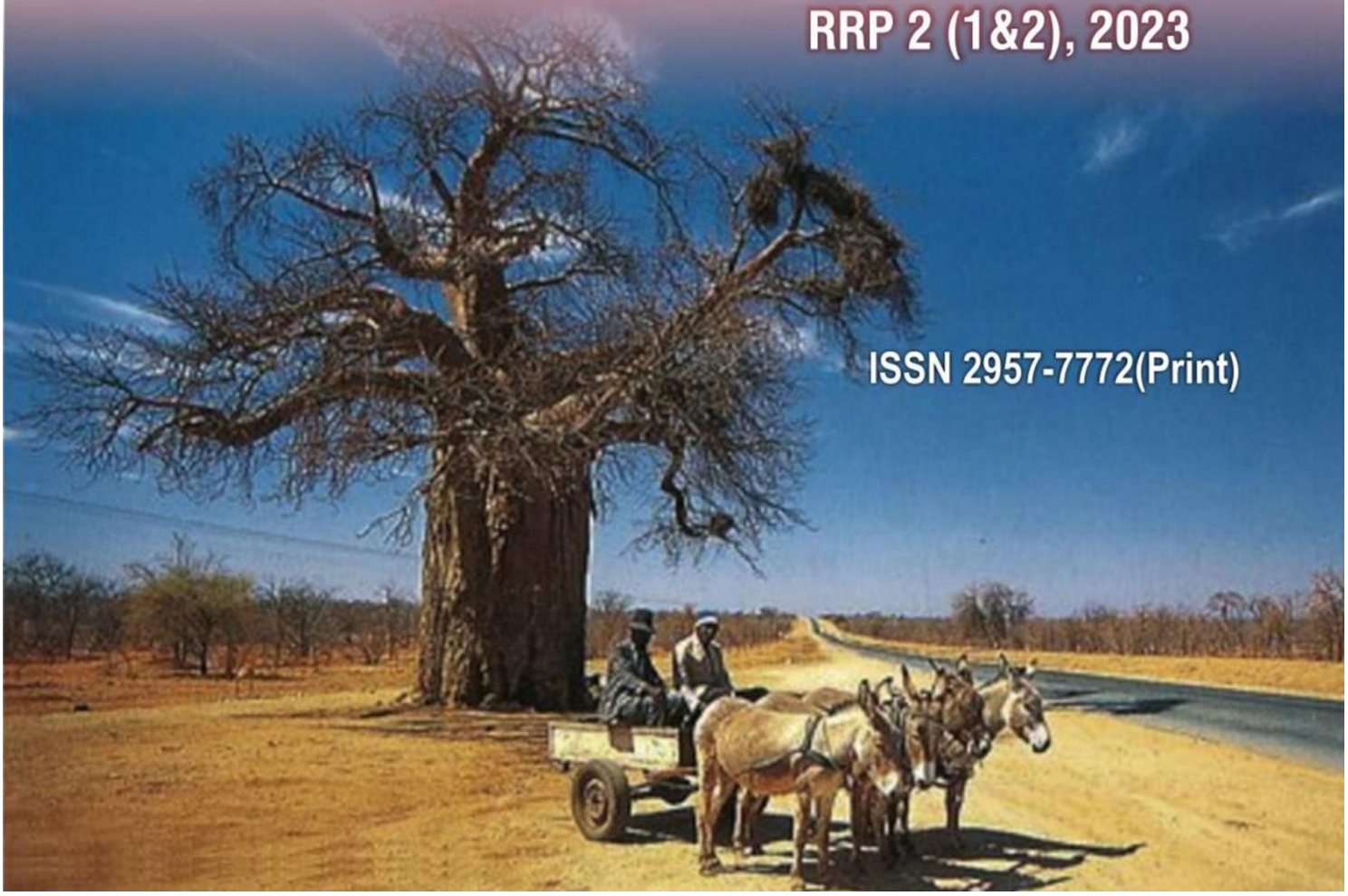

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About the Journal

JOURNAL PURPOSE

The purpose of the *Review of Rural Resilience Praxis is* to provide a forum for disaster risk mitigation, adaptation, and preparedness.

CONTRIBUTION AND READERSHIP

Sociologists, demographers, psychologists, development experts, planners, social workers, social engineers, economists, among others whose focus is that of rural resilience.

JOURNAL SPECIFICATIONS

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SCOPE AND FOCUS

As much as the urban territory is increasing by each day, the rural economy, especially in many developing countries, still retains a great proportion of the extractive and accommodation industry. Retaining some space as rural remains critical given the sectors role in providing ecosystem services to both wildlife and humanity. In this light, rural resilience as practice beckons for critical studies especially in the face of the ever-threatening extreme weather events and climate change that then impact on the livelihoods and lifestyles of the rural communities. Review of Rural Resilience Praxis (RRRP) comes in as a platform for critical engagement by scholars, practitioners, and leaders as they seek to debate and proffer solutions of the rural sector as well as trying to champion the philosophy of the right to be rural. The issue of conviviality between the

different constituencies of the sectors, compiled with the competing challenges of improving rural spaces while also making the conservation, and preservation debates matter is the hallmark of this platform of criticality. The journal is produced bi-annually.

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Articles must be original contributions, not previously published and should not be under consideration for publishing elsewhere.

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A total number of words: 5000-7000 words and set in 12-point font size width with 1.5 line spacing.

Language: British/UK English.

Title: must capture the gist and scope of the article.

Names of authors: beginning with the first name and ending with the surname.

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Abstract: must be 200 words

Keywords: must be five or six containing words that are not in the title.

Body: Where the authors are more than three, use *et al.,*
Italicise *et al., ibid,* words that are not English, not names of people or organisations, etc. When you use several authors confirming the same point, state the point and bracket them in one bracket and in ascending order of dates and

alphabetically separated by semi-colon e.g. (Falkenmark, 1989, 1990; Reddy, 2002; Dagdeviren and Robertson, 2011; Jacobsen *et al.*, 2012).

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"Water Provision Will Trigger Us into Action and Livelihood Vibrancy and Skyrocketing": Deciphering Messages from Biriri Wards, Chimanimani

FELIX MADYA[1], MTHABISI MSIMANGA, PRECIOUS MUBANGA, NOMQHELE NYATHI, GILBERT MUSHANGARI, SITHANDEKILE MAPHOSA, DERECK NYAMHUNGA[2]

ABSTRACT

Water remains the source of all human activities and its availability in arid and semi-arid regions has been erratic with most rural communities of Zimbabwe affected the unavailability. The article explores how the dwindling of water resources can push communities into water conservation practices and how the availing of water provision projects has pushed rural communities into action. Climate change has pushed the groundwater further and caused low rainfall, leaving rural communities that depend on rain-fed agriculture and borehole irrigation short of water. The article is based on the argument that groundwater and rainfall patterns with periodic droughts and extreme weather events. The study engaged a qualitative research methodology with a case study research design. The study used purposive sampling to sample for the participants. The study used in-depth interviews and focus group discussions. It adhered to all ethical principles. The study revealed that the availability of water will trigger communities into livelihoods diversification and changing of of rural communities" lifestyles. The study found that rural communities have begun to

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diversify their livelihoods and taking advantage of the water provision projects. The study concludes that the increase of water provision can be the missing link for rural development. The study recommends diversification of water provision.

Keywords: semi-arid, groundwater, agriculture, diversification, conservation, droughts

INTRODUCTION

IPCC (2012) observed that not only greenhouse gas (GHG) emissions are already changing the global climate, but also that Africa will experience increased water stress, decreased yields from rain-fed agriculture, increased food insecurity and malnutrition, sea-level rise and an increase in arid and semi-arid land as a result. Extreme weather events, notably floods, drought and tropical storms, are also expected to increase in frequency and intensity across Africa (*ibid.*). The World Meteorological Organisation Assessment Report (WMO, 2013) observed that years the 2001-2012 were the warmest years with an expected increase in global average temperature over the next two decades. The latest prediction suggests that global temperatures could rise by 2100 (Allen *et al.,* 2018). IPCC (2013) argued that climate change is real and Africa is the most vulnerable continent as it is likely to warm during this century and the regions warming more than the moist tropics. The climate of the most parts of the African continent may be classified as arid and semi-arid with high drought risks (Raduba, 2019).

Southern Africa is vulnerable to climate change and the rural communal lands are in severe danger of droughts due to water variability. Chagutah (2010) has observed that Zimbabwe is particularly vulnerable due to its dependence on rain-fed agriculture and climate sensitive resources. Agriculture‘s sensitivity to climate-induced water stress is likely to intensify existing problems of declining agricultural outputs, declining economic productivity, poverty and food insecurity with smallholder farmers particularly affected (Brown *et al.,* 2012). Whereas clean water has been an elusive goal for most sub-Saharan African countries, especially among the poorest rural communities, climate change-induced extreme weather events such as drought aggravate the situation (Chigusiwa *et al.,* 2022). An estimated 64% of the population in subSaharan Africa has no access to clean water, compared with 2% in the developed world (WHO/UNICEF, 2021). IPCC (2021) observed that a decline in rainfall in Southern Africa in recent years went up to 50% as a result of climate change.

Poor institutional arrangements and governance exacerbate water shortages as only 4% of annual renewable water flows are harvested and stored in sub-Saharan Africa compared with 70%-90% in developed countries (Lehmann *et al.*, 2018).

Apart from encumbering the attainment of Sustainable Development goal 6 of achieving universal access to clean water and sanitation (UN-WATER, 2019), drought has modified the conditions under which social-interactions occur (Carleton *et al.*, 2016). In the absence of formal distribution channels like local authorities, the resultant distributional burden of drought-induced water scarcity is marred with inefficiencies and often skewed toward certain groups within societies that bestir disgruntlement, thereby increasing the likelihood of violent confrontation and conflict at water points (Roche *et al.*, 2020). While Africa is identified as a continent highly vulnerable to climate change impacts due to its weak coping capacity, the vulnerability of countries varies. In the past decades the peculiarity of Southern Africa, *vis-à-vis*, climate change vulnerability, especially water scarcity, has become an issue of political and economic concern (Patrick, 2020). Despite efforts to ensure access to water for all, the exponential increase in violent protest around water scarcity has become an issue around Africa (Kusangaya *et al.*, 2014). The article examines how water provision will usher people into action.

THEORIES UNDERPINNING THE STUDY

The theory that guided this study is the theory of public goods propounded by Samuelson (1954). The theory of public goods takes the standpoint that the privatisation of public entities will likely lead to inadequate standards of infrastructure for two reasons (*ibid.*). The first problem for the failure arises from the public goods nature of standards that inevitably leads to a free rider problem and the resul is under-investment in the provision of infrastructure (*ibid.*). The problem of free riders is that Zimbabwean rural district councils and are operating using a neo-liberal standpoint without investing in water provision infrastructure in the rural areas, leaving the rural communities vulnerable to climate change and its vagaries. The second reason is coordination failure because of wrong sub-optimal investments (*ibid.*). Rural district councils in Zimbabwe lack the capacity to build resilience in their areas because they are over -invested in politics more than development (*NewsDay*, 2022). The delivery of public goods such as water will force rural people into action against climate change as it allows them to kickstart projects successfully. This concept becomes

applicable to this study as it brings to the fore the reasons that lead to action against climate change through provision of a public goods such as water.

LITERATURE REVIEW

This section looks at the literature from past studies trying to understand how these were done trying to navigate how can the present study can provide a way forward to fill the gaps on climate change and provision of water. The literature review looked at the water supply in the world.

WATER SUPPLY IN GLOBE

Huntjens *et al*. (2012) observed that there has been a rise in the frequency of extreme events and water scarcity in Africa and the challenges these pose to communities with weak coping capacity. The increase in extreme climate events will lead to increase in water extremes, thereby affecting freshwater availability (Gabrielsson and Ramasar, 2013). Nganyanyuka *et al.* (2014) argue that, whilea sustainable proportion of the population in Africa are denied access to public water, there are inconsistencies between water access as stated in the official statistics, and the tangible state of affairs from the viewpoint of end-users. The focus on the security dimensions of climate change to global peace and stability has also received increased global attention in recent years (Scott 2015; Chirisa *et al.*, 2016).

It is pertinent to note that while the variation in rainfall and temperature pattern, as a result of the impact of climate change, will immensely affect the availability of water resources, infrastructure capacity and the management of available water in the face of its depletion is also key (Patrick, 2020). Gain and Giupponi (2015) argue that water scarcity is rooted in not only the inadequacy of water resources, but also in the management and institutional incapacity to provide water service. Jeunesse *et al.* (2016) argue that tension and conflict can arise from competition over the use and control of water resources at the national and transnational or local level. Birkenholtz (2016) affirms that the threat to continuous access to a level of affordable water has stirred people to resort to actions that can destabilise the relative peace in the community. Water provision remains an issue in Zimbabwe, an issue that can drive people in the rural communities into action. Because of poor institutional arrangements in developing countries, in general, and in rural societies, in particular, the burden of environmental anomalies, like drought, quickly diffuses into the household matrix without a cushion from some prearranged shock absorbers (Garrick and

Hahn, 2021). Nunbogu and Elliot (2021) argue that access to water and its distribution is influenced greatly by gender due to socio-cultural, political and economic roles assigned to men and women. In rural communities in most developing countries, the role of sourcing water for household use usually falls on women and girls (Rao *et al.,*
2019).

This increases the exposure of women and girls to high risk of assaults and physical trauma (Geere *et al.,* 2018). The scarcity of water in low-income countries like Zimbabwe can prompt a new dispensation of people into action against climate change. Collins *et al.* (2019) observed that violence has emerged, indicating that violence experienced during water acquisition in times of shortages is largely gendered and disadvantages women and girls more. Nunbogu and Elliott (2021) argued that violence experienced at water points comes in the form of physical, psychological and sexual violence. Physical violence is perpetrated by both male and female adversaries. The feminist theory disadvantages women and girls more due socio-cultural power structures (Anwar *et al.,* 2020). Zimbabwe, like most Southern African countries, is a semi-arid country whose annual water depends heavily on irregular rainfall patterns. The region has climatically shifted significantly amid a climate crisis that is threatening the ecological balance within the region (Chigusiwa *et al.,* 2022).

The Southern African region has been identified as one of the most vulnerable to climate change and is expected to experience more frequent and prolonged droughts and long dry spells (IPCC, 2021). Zimbabwe is a landlocked country and its major source of safe drinking water in communal areas is groundwater that is relatively cheaper to clean (Chigusiwa *et al.,* 2022). It is imperative to note that water the crisis will push Zimbabwe into action on climate change and water conservation strategies in rural Zimbabwe like in other countries where the reuse of water for agricultural and industrial use has been championed to sustain families in terms of food security and livelihoods maintenance.

RESEARCH METHODOLOGY

The study investigated the impacts of water provision in the rural communities amid the vagaries of climate change within the context of rural development and poverty alleviation through agricultural projects and other livelihoods. The study used a qualitative methodology with a narrative research design. DeMarco (2020) observed that a narrative research design aims to explore and

conceptualise human experiences as it is represented in textual form. The study used purposive sampling to sample participants for the study. The study drew a sample of 12 respondents and four informants. The study used the focus group discussions and in-depth interviews. The study empoyed narrative data analysis to analyse the data findings. The study adhered to all ethical principles and noteworthy is the observation of the anonymity ethical principle. The study adopted the use of pseudonyms to maintain the anonymity of the participants assigning numbers to participants.

FINDINGS

The water crisis in Zimbabwe and beyond has affected many livelihoods and led to the entrapment of many families into debt. The study seeks to explore how water provision can trigger rural families in their fight against rural poverty and lack of development. The findings that emerged were along the lines of the impacts of climate change on water provision in rural areas and the provision of water triggering action from Biriri wards in the rural communities of Chimanimani.

IMPACTS OF CLIMATE CHANGE ON WATER PROVISION IN RURAL AREAS

Rural people showed an understanding on the impacts of climate change on the provision and availability and provision of water in rural communities, with some communities forfeiting their livelihoods because of climate change direct impacts on water provision. Participant 1 indicated that:

> ―The rainfall patterns have changed because of this climate change. The places we lived [in] before had water that did not dry [up], we did not fetch water two kilometres away or five kilometres away, we had water around the places we lived [in], but at the moment, the areas that had *madove* where we grew rice and other crops, no longer exist. Some of the wetlands (*madoro*) that were not occupied are now occupied with houses and they are now dry lands.‖

These findings revealed that water scarcity has triggered inaction and unsustainability in the rural areas as most of the wetlands are not conserved but inhabited because of climate change. The study revealed that the rainfall season had altered and this had caused water scarcity in rural areas, leading to people lagging behind in terms of development. Participant 4 revealed that:

> ―In the past, we used to get water from October up to April or May as it used to rain, but at the moment, we are getting it from November to January and some showers in March and it is gone there are no rains.‖

These findings indicated that climate change has affected water provision in most wards in Chimanimani with some communities experiencing low rainfalls for a short period of time and struggling to find water. This change in the rainfall patterns has been characterised by inaction, crop failure and food insecurity. The findings revealed that climate change has had an impact on groundwater and water tables in Chimanimani rural communities. Participant 6 said that:

> ―My observation is that the signs of climate change are that where we used to fetch water before, we no longer fetch water. The wells, the water tables have gone down, even bananas are drying because they are lacking water as we do not have enough water.‖

The findings have revealed that climate change has had adverse impacts on communities, forcing them into inaction as most of them are agrarian-based communities and without water, agriculture is useless along with other livelihoods, pushing the communities towards donor dependency rather than self-sufficiency development.

THE PROVISION OF WATER TRIGGERING ACTION

The study revealed that the provision of water can spark action from the people from Biriri wards in the rural communities of Chimanimani. The study revealed that the major problem hindering rural development in Chimanimani is the lack of water and the provision of water. The findings of the study revealed that people face acute water shortages for their day-to-day livelihoods. Participant 8 said that:

> ―The problem we have is water for people to plough. If we can get more boreholes in our community, even more irrigation schemes, so that we can be able to do irrigation since the rains are now low so that we can survive, both people and animals. If we get irrigation, we can get something to assist us.‖

These findings revealed that since rural communities are agrarian communities, provision of more water through irrigation schemes and
borehole drilling can ensure food security for the propel. The findings of the study indicated that water availability can encourage people through the

development of projects that use irrigation. Participant 9 revealed that: ―We need water because the boreholes we have at the moment are now very low and our boreholes are at the top [because of the low water table]. Water provision will accelerate us into action through projects as I have pigs, but the problem I face now is lack of water.‖

The findings revealed that lack of water has been the main impediment to development and action to alleviate poverty among rural communities.
Participant 10 said:

> ―The problem is that we need boreholes. This side that is our main problem, we cannot do any project that is successful because we do not have water. Everything is [at a] standstill. There is nothing we are doing except that if you get chickens to keep and you do not have water, they will need a lot of water whilst you getting one or two buckets per day. So, there is nothing. We are on at a standstill. They should assist us with boreholes to complete our projects.‖

The findings of the study indicated that the lack of water is pushing communities into rural poverty and food insecurity as most of the households are failing to kick-start projects. The availability of water in rural communities will trigger communities into action and kick-start projects.

DISCUSSION

The findings of the study revealed that climate change has an effect on the availability of water as most of the rural communities in Zimbabwe are finding it hard to carry out production. The study showed that climate change has impacted the availability of water through the shortening of the rain season, making agricultural production impossible, therefore, leaving families in poverty and food insecure. The study revealed that the impact of climate change has been the shortening of the rain season in Zimbabwe from five months to three months. The study showed that groundwater has dwindled further, making it impossible for agricultural production and other rural livelihoods that require water. In support of these findings are Chuma *et al.* (2016) who observed that groundwater has dwindled in Zimbabw, driving most communities into hunger, starvation and poverty. Concurrent with these findings is Chikodzi (2013) who noted that there is a decline in groundwater in most parts of Zimbabwe and this will affect economic development especially rural economies.

The study showed that the availability of water will trigger communities into action as the lacking of water has remained the main problem hindering projects for rural communities. Rural communities need water to kick start the irrigation projects. The study revealed that the availability of water will trigger communities into action as the rains remain low people now look forward to the provision of more boreholes for communities to augment the little rain water with borehole irrigation schemes that can sustain communities. The study indicated that the lack of water was stopping the ploughing by the rural communities hence the need for irrigation schemes through addition of borehole schemes. Similar to these findings are Dube *et al.* (2021) that have observed that the provision of irrigation schemes in Tsholotsho has led to food security the area as people were triggered into action to grow crops using the irrigation schemes improving food and income security in the rural areas.

The study revealed that the available boreholes are not deep enough and rural households are engaging in projects such as the rearing of pigs which requires a lot of water. Similar to the findings are Mutiro and Lautze (2015) who observed that improving agriculture and enhancing productivity through smallholder irrigation is a strategy for poverty alleviation and improvement of livelihoods in rural communities, as the majority poor depend on agriculture. This indicates that the provision of water will trigger rural communities into action towards rural development. The study indicated that there are no successful projects in some areas as there are no boreholes that provide water for rural communities to embark on projects. In support of these findings on the provision of water strengthening and triggering rural communities into action is the theoretical framework the Public Goods Theory by Samuelson (1954) that states that public, and not privatised, building infrastructures can help communities build resilience and adaptation capacity.

CONCLUSION AND RECOMMENDATIONS

In conclusion, the study concludes there remains gaps on the sustainability of the actions that water provision can trigger as there remains the need for agro entrepreneurship in most rural areas of Zimbabwe through the farming of fast maturing crops that guarantee food and income security. The provision of water remains the most needed for rural development and poverty alleviation. There are different views on that water provision will trigger rural communities into action as the agricultural sector and the models of rural development in

Zimbabwe still lack innovation and entrepreneurship factors that can propel rural communities into action towards rural development.

The study recommends the training of rural communities in agro entrepreneurship and innovative farming techniques that guarantee food security. There is need for development frameworks for water provision that ensure social and gender inclusiveness. There is need for sustainable use of water resources in rural communities as this can improve households‘food and income security, while ensuring that coming generations are guaranteed of a bright future. There is need for the invention of innovative use of water resources such as the re-use of water. There is need for future studies to look into the sustainability of the provision of water for agriculture as a form of rural development as most of cash crops grown in rural areas threaten sustainable development through deforestation.

REFERENCES

Allen, J.T. (2014). Climate change and severe thunderstorms. In: *Oxford research Encyclopedia of Climate Science*. Available online: https://doi.org/10.1093/acrefore/9780190228620.013.62

Anwar, N.H., Sawas, A. and Mustafa, D. (2020). _Without Water, There Is No Life‘: Negotiating Everyday Risks and Gendered Insecurities in Karachi‘s Informal Settlements. *Urban Studies*, *57*(6), 1320-1337.

Brown, J., Cairncross, S. and Ensink, J.H. (2013). Water, Sanitation, Hygiene and Enteric Infections in Children. *Archives of Disease in Childhood*, *98*(8), 629-634.

Carleton, R.N. (2016). Fear of the Unknown: One Fear to Rule Them All?. *Journal of Anxiety Disorders*, *41*, 5-21.

Chagutah, T. (2010). Climate Change Vulnerability and Preparedness in Southern Africa: Zimbabwe Country Report. Cape Town: Heinrich Boell Stiftung.

Chigusiwa, L., Kembo, G. and Kairiza, T. (2023). Drought and Social Conflict in Rural Zimbabwe: Does the Burden Fall on Women and Girls? *Review of Development Economics*, *27*(1), 178-197.

Dube, T., Shekede, M.D. and Massari, C. (2022). Remote Sensing for Water Resources and Environmental Management. *Remote Sensing*, *15*(1), 18.

Gabrielsson, S. and Ramasar, V. (2013). Widows: Agents of change in a Climate of Water Uncertainty. *Journal of Cleaner Production*, *60*, 34-42.

Gain, A.K. and Giupponi, C. (2015). A Dynamic Assessment of Water Scarcity Risk in the Lower Brahmaputra River Basin: An Integrated Approach. *Ecological Indicators*, *48*, 120-131.

Garrick, D.E. and Hahn, R.W. (2021). An Economic Perspective on Water Security. *Review of Environmental Economics and Policy*, *15*(1), 45-

66.

Huntjens, P. *et al*. (2012). Institutional Design Propositions for the Governance of Adaptation to Climate Change in the Water Sector. *Global Environmental Change*, *22*(1), 67-81.

Kusangaya, S. *et al*. (2014. Impacts of Climate Change on Water Resources i Southern Africa: A Review. *Physics and Chemistry of the Earth, Parts a/b/c*, *67*, 47-54.

Mutiro, J. and Lautze, J. (2015). Irrigation in Southern Africa: Success or Failure? *Irrigation and Drainage*, *64*(2), 180-192.

Raduba, D. (2019). *The Use of Land Restitution as a Means of Protecting Indigenous Knowledge Systems for the Purpose of Realising Food Sovereignty* (Doctoral dissertation).

Roche, J.W. *et al. (*2022). Water balance For Gaged Watersheds in the Central Sierra Nevada, California and Nevada, United States. *Frontiers in Forests and Global Change*, *5*, 861711.

Samuelson, P.A. (1954). The Pure Theory of Public Expenditure. *The Review of Economics and Statistics*, *36*(4), 387-389.