1 Addressing Climate Change through Indigenous Knowledge Systems

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Hiding from the blistering heat, a brawny calf with a short papyrus rope tied around its neck leaned on a mopane tree. Tears rolled down the calf's eyes as if aware of its impending doom. A swarm of flies delivered a sad eulogy as they buzzed around the calf's nose. An uninvited cloud of dust swirled at a distant driven by the hot and dry winds. It was almost Christmas time, yet the clouds were empty, the rivers had dried, the grass was all gone, and the cattle were dying. Any hope of survival was fast disappearing like morning dew on a sunny summer morning.

In high school, we were taught that the southern parts of Zimbabwe, particularly in the Beitbridge district, were only suitable for animal husbandry rather than crop cultivation. Eager to know why, I visited a local library and delved into several geography textbooks. Land degradation was turning parts of the Beitbridge district into a desert. Perennial erratic rainfalls made the district susceptible to droughts. In the past two decades, the frequency of droughts has significantly increased, possibly due to climate change [1]. The calf was the latest victim of climate change after losing its mother at birth.

Storytelling as Open Research

"It is the cycle of life", one villager said, fruitlessly trying to conceal the pain of losing a dozen cattle due to lack of water in the once majestic Mzingwane River and its tributaries. "Our loss is a gain to the forests because when cattle die, they decompose into valuable nutrients essential for plant growth". The explanation was startling considering a cow is a symbol of wealth among the Venda people in Beitbridge. My brother-in-law once told me a story of a Venda village in Beitbridge where the community rejected plans to build a school. The village elders argued the school would take away important grazing land for their cattle. It is quite unfortunate that the government officials from the ministry of education probably dismissed the perceptions of the villagers and labeled them primitive, pedestrian, and unproductive.

Although despicable, researchers often view themselves as the saviors imbued with unassailable scientific wisdom to address global challenges [2]. Listening to the villagers talk about the loss of cattle, short and erratic rain seasons, increased atmospheric temperatures, and a decrease in wild fruits, I realized they understood

climate change probably better than most climate experts. Without using scientific jargon or citing the latest climate science research, the villagers discussed the causes, effects, and possible adaptation and mitigation strategies using folklore, proverbs, and personal observations. The villagers were not hopeless, ignorant, and primitive victims as portrayed in many academic studies and media reports. What fascinated me was that the villagers openly shared their knowledge, experience, and observation. They allowed fellow villagers to critique their views publicly. Theories about climate change were proposed, rebuffed or supported openly. The villagers were knowledgeable experts who required collaborations rather than consultations with the government and climate scientists.

Openness in Indigenous Knowledge Systems

In many African communities, knowledge is not an attribute of an individual, but is collectively owned by the community. Indigenous knowledge systems have survived for many centuries without preservation as written text. Personal observations are often celebrated as a key resource for the acquisition of new knowledge. This is best illustrated by Shona proverbs such as *afamba apota*—traveler sees what lies beyond sight—and *takabva neko, kumhunga hakuna ipwa*—we have been there, there are no sweet sorghums in a millet farm. Together with proverbs and folklore, personal observations knitted into stories are shared openly during social gatherings such as funerals, weddings, community harvests, or religious meetings. Thus, in many African communities, storytelling is the academic research equivalent to open data. Listeners are free to use the story in any way meaningful to their contexts. Hence, openness is the key ingredient for knowledge preservation and transmission in indigenous knowledge systems, particularly in Zimbabwean communities [3].

Recently, I searched for articles on climate change in Africa using SCOPUS and found around 27,840 documents. However, less than 7% of the documents were available through open access. Hiding research behind paywalls does a great disservice to the communities that funded the research or took part in the research as subjects. The scientific community should learn about the importance of openness from indigenous knowledge systems. For example, through living in proximity to the environment, indigenous people developed a knowledge system important in climate science. The indigenous knowledge is openly policed through taboos, preserved through folklore and proverbs, and transmitted through storytelling [2,4]. Researchers have taken advantage of the openness in indigenous knowledge and used it to compliment climate science in areas where meteorological

data is absent [1,5]. Indigenous people did not hide their personal observations behind subscriptions; they freely share with researchers, thus contributing to the advancement of climate science.

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