



Challenges for expanding inventories of climate possibilities through indigenous and local knowledges in rural Zambia

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ABSTRACT

This article explores the integration (or marginality) of indigenous and local knowledge (ILK) in donor-driven community climate adaptation (CDCA) projects and the extent to which this helps expand inventories of adaptation possibilities for host communities and strengthen climate adaptation resilience in Zambia. Through multi-level qualitative research design, this study reveals that, even where climate interventions are intentional about being inclusive of community knowledge, they are likely to promote policy-centric knowledges and interventions that invisibilises ILK. Empirical evidence shows the application of CDCA expresses top-down assumptions of livelihood resilience and embeds uncritical views of what community is, including what might be socially and culturally appropriate forms of adaptation. CDCA implementation strategy is exclusionary and misaligned with ILK, affecting possibilities of knowledge intersection. This article elucidates how climate adaptation that marginalises ILK fails to expand inventories of climate adaptation possibilities for communities supposed to be adapting and proposes how this gap could be bridged. (This article is published in the thematic collection 'African ecologies: the value and politics of indigenous knowledges', edited by Adriaan van Klinken, Simon Manda, Damaris Parsitau and Abel Ugba.)

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Introduction

At the core of Africa's decolonisation perspective on the Anthropocene lie longstanding and ongoing histories of colonial and capitalist modernity that have shaped and continue to shape vulnerabilities of the continent to changes in ecosystems and natural environments (van Klinken *et al.* 2024). Whilst literature on environmental politics reveals ongoing processes of enclosure, commodification and dispossession of African resources under the guise of climate change mitigation and adaptation (Manda & Nyambe 2023), van Klinken *et al.* (2024) have argued that indigenous and local knowledge (ILK) remains important not only for understanding traditional responses to environmental changes but also for how these could be framed for uptake in

climate action—an important epistemological feature. By acknowledging ‘the value of diverse forms of knowledge such as scientific, as well as Indigenous knowledge and local knowledge in understanding and evaluating climate adaptation processes and actions to reduce risks from human-induced climate change’ (IPCC 2022: 7), the Intergovernmental Panel on Climate Change (IPCC) opened new intellectual ground requiring empirical examination of the state of play of ILK and the implications for adaptation. Scholars in African environmental studies have engaged diverse disciplinary perspectives and methodologies in humanities (Oba 2014), literary and cultural studies (Aghoghovwia & McGiffin 2024), philosophy (Chemhuru 2022) and religion (van Klinken 2021). Doing so, they have begun to unravel the social and cultural epistemologies through which local communities understand vulnerability and respond to climate change and how this knowledge could go to the heart of policy and action. Indeed, to many indigenous communities, climate change is not a new feature, and recent evidence demonstrates how ILK helps to strengthen the understanding of human–environment relationships, increasing the effectiveness, sustainability and equity of adaptation measures (Carmona *et al.* 2023: 1). Advancing African ecologies, van Klinken *et al.* (2024: 2) have invited us to be creative and innovative in the quest to understand, address and possibly fund solutions for the major environmental challenges on the continent. Whereas development actors internationally and nationally have responded through initiatives that incorporate local communities as architects of adaptation strategies, the application of ILK in climate adaptation strategies remains an interesting area of research—and is a focus of this study.

Climate adaptation is framed loosely as change—for example, behaviour, social or economic—meant to reduce risk in response to, or in anticipation of, climate change (Pisor *et al.* 2022). International development actors such as the World Bank are acknowledging and integrating local communities as part of community driven climate adaptation (CDCA) strategies (Kandel *et al.* 2023). Yet, ILK remains peripheral to mainstream climate science and adaptation initiatives, which typically uphold and privilege Western science and ‘experts’ within the hierarchy of scientific evidence—often resulting in the top-down implementation of contextually inappropriate and ineffective policy solutions that risk exacerbating existing inequities and marginalisation (Milbank *et al.* 2021). Specifically, a general focus on the science of the climate crisis and ecological collapse, and related marshalling of technocratic knowledge about climate in the literature has failed in terms of mass appeal or providing clear material benefits for poor ‘communities’ (frequently framed as rural, indigenous and/or poor in adaptation projects) (Huber 2022).

Various actors have emphasised the need to reframe and advance adaptation in line with lived experiences, capacities and aspirations of self-determination. These calls have gained credence in the scholarship on decolonising climate and adaptation (Johnson *et al.* 2022). There are repeated calls for ‘communities’ on the frontline of climate change to take the lead in choosing their own adaptation (Pisor *et al.* 2022). As with other investment projects, supporting ‘community’ autonomy is seen as an important component for sustainability and equity

(Manda 2022), and that the effectiveness of climate change adaptation depends on this (Pisor *et al.* 2022). The argument is that co-optation of ‘community’ in climate adaptation aligns solutions to local conditions, needs, values and norms, leading to sustainable risk reduction. How ILK is framed and integrated in adaptation projects is less understood.

This article reflects on four important dimensions of climate adaptation intervention:

1. the local framings and understanding of vulnerability and climate change response pathways from a social and cultural perspective;
2. the structure and organisation of CDCA measures and the integration of local climate needs;
3. the integration or marginality of ILK in CDCA projects and implications thereof;
4. how ILK could be deployed to help build climate resilience and expand inventories of adaptation possibilities for communities supposed to be adapting.

The rest of the article is organised as follows. The next section (2) presents methods. Section 3 focuses on how local communities in rural Zambia experience government–donor CDCA initiatives across the 4 dimensions and is followed by a discussion section (4), which situates the former into the wider empirical and theoretical context. The concluding sections reflect on (5) the study results, particularly the marginality of ILK, and (6) how CDCA initiatives can be structured and organised to expand inventories of possibilities for adapting communities and to shape the sustainability and equity of adaptation measures.

Using donor CDCA projects to analyse ILK

Using donor-driven CDCA as an avenue for analysing the integration (or marginality) of ILK in climate adaptation allows for an exploration of how powerful development actors engage with ILK. Recent efforts aimed at the decolonisation of knowledge can only be effective if donor efforts are unpacked.

The Barotse floodplain—also known as the Bulozhi plain or Zambezi floodplain—is one of the greatest wetlands in Africa.¹ It is inhabited by the Lozi-speaking people and is found in the western region of Zambia (about 600 km from the capital Lusaka). The floodplain is 230 km long with a width between 30 and 50 km, with peak water levels in the months April to July, and the month of November being the period when the water levels are the lowest (Sampa *et al.* 2019). The timing and duration of annual floods determine the conditions of the plain and the way it supports production and livelihoods. Subsistence agriculture dominates, drawing about 280,000 ha of land into herding, cropping (for example, rice, maize, cassava, sorghum and millet) and

¹The Barotse cultural landscape has outstanding universal value (see <https://whc.unesco.org/en/tentativelists/5428/>).

fishing, livestock and natural resources. The region is one of the most vulnerable regions to climate change, attracting policy attention (Funder & Dupuy 2022).

In Zambia, the Strengthening Climate Resilience in the Barotse Sub-basin (SCReBS) project has since 2013 been implemented under the Pilot Programme for Climate Resilience (PPCR) through the Ministry of Green Economy and Environment (MGEE) and funded by Climate Investment Funds. Phase 1 of the PPCR (2010–13) focused on mainstreaming, capacity building and information sharing at the national level. The project was extended to Phase II (2014–19) and, with additional financing from the World Bank of US\$14.6 million, to 2022 (Sinyangwe 2020). The project aimed to strengthen climate resilience through the development of livelihoods and infrastructure. Each participating local group opened a bank account allowing direct transfers of funds. Each sub-project has a management committee: a chairperson, treasurer, secretary and at least three committee members. Sub-grants have funded diverse sub-projects (Appendix), with participating communities receiving between ZMW40,000 and ZMK250,000.² Community in this project is constituted as the local groups identified/selected to manage adaptation grants and sub-grants. We purposively selected SCReBS based on its focus on climate-risky areas in Zambia and its focus on drought and flood risk resilience. Communities in the Barotse sub-basin are among the poorest (Milupi *et al.* 2020) and most vulnerable to climate change, while at the same time they lack resources to adapt to significant changes in their local ecosystems (MNDP 2015). However, the Lozi speaking people have rich ecological knowledge, adapting for decades to flood disasters. The SCReBS project supports *ex ante* risk climate and disaster risk reduction in the disaster-prone Barotse sub-basin, improving livelihoods and strengthening resilience to climate variability.

We selected participants of climate adaptation sub-projects, including project staff (at provincial and district government levels) to solicit views on the CDCA and related outcomes. In selecting participants, we considered gender and age, and where possible longevity in the project, including case studies of local knowledge holders. We selected four districts (Nkeyema, Kaoma, Luampa and Mongu) in the northern part of the Barotse Sub-Basin and three (Sioma, Mwandia and Kazungula) in the southern part.

There are about 1,650 sub-projects in the Barotse Sub-Basin. We selected 20 sub-projects under three broad project formulations: hard, soft and integrated strategies. Small-scale ‘*hard*’ infrastructure projects aim to improve local infrastructure and upgrade existing infrastructure to withstand extreme weather events. ‘*Soft*’ adaptation or support to farm-level systems target livelihood diversification and productivity. Meanwhile ‘*integrated*’ sub-projects mix hard and soft adaptation strategies. The sub-projects are administered through grants at different levels: district grants, ward grants, community grants and individual champions. We incorporated ten *soft-adaptation, local village, chicken and goat projects*, six integrated, and four small-scale hard *infrastructure* projects.

²\$1 = ZMW17.5.

Fieldwork was conducted between October 2021 and January 2023, and in May 2024. We positioned local people as knowledge holders through informal conversation, observation, and group discussion. Data collection was conducted in the local languages Lozi and/or Tonga, allowing rich and detailed conversations. We conducted a *documentary analysis* of SCReBs and other climate-related documents to get background information about the project and the CDCA. We analysed how resilience is approached and supported, and the application of the ILK. We interviewed staff at the MGEE/PPCR: project officers at national, provincial, district and sub-district levels ($n = 25$). They included representatives of the *Litunga/King*. We convened *group discussions* with sub-project participants using an open-ended interview guide ($n = 20$). Groups were largely mixed across gender and generation except for the sub-projects that were exclusively run as women's groups. This helped to obtain information on how groups of people think or feel about strengthening climate resilience and the role (or marginality) of ILK. Altogether, we constituted 20 FGDs (focus group discussions), one per sub-project at the community level in each of the seven study districts. Finally, we used *non-participant direct observation* to gain an on-the-spot impression of the state of the sub-projects, allowing informal questions to be posed based on the observations (Hamilton & Finley 2019).

All data collected from interviews and focus group discussions were coded and analysed using content analysis (Hsieh & Shannon 2005). We sorted qualitative data using NVivo, creating nodes as thematic areas. Nodes were then analysed manually to explore emphasised elements, and relationships. Analysis focused on narratives around the implementation structure and organisation of the project, resilience building and the role of ILK. Where necessary, we retained qualitative quotes to maintain grounded narratives.

Local perceptions of vulnerability, Lozi spirituality and environmental protection

Droughts and floods were frequently cited extreme weather events experienced by participants since the 1990s. To the Lozi, although there is a long history of environment-related shocks, '*what is new is the intensity, frequency and severity of climate change*' (Interview, Academic, 2024). Climate change is seen as changes to rainfall patterns, changing life and reducing agricultural yields, with opinions that water pollution by the spirit of the river is responsible (Sampa *et al.* 2019). The Lozi-speaking people observe a depletion of birds (such as the *linongolo*—Openbill Stork), fish (*dona*) and plant species. This includes reptiles (such as the *lingongole*, a huge imaginary water snake). Participant's accounts reveal experiences of severe hunger, with crops such as maize and rice drying up during droughts, leading to poor harvest, reduced crop diversity and narrow consumption patterns. They report a high prevalence of livestock diseases, reduced diversity of forest animals, reduced livestock, high temperatures and reduced pasture for livestock. Participants report impacts of reduced water availability on pasture and domestic livestock affecting incomes and food. One

participant in Kazungula explained: ‘*in these years, poor rains affected our crops, and our environment was dry. We face diseases, shortage of water for our own drinking and pasture for animals*’ (FGD, Kazungula District, 2021). Meanwhile, floods reportedly wash away crops such as maize and groundnuts, with further impacts on assets (including domestic animals) and housing infrastructure. For indigenous communities such as the Lozi, there is nothing new about climate change. Such communities have lived with and adapted to climate change for centuries.

Meanwhile, the Lozi have an exceptional systematic structure of authority: from the Litunga to queens of the south and north, and Indunas who act as ministers, and chiefs. It is believed the Litunga is *kaongolo kanyambe* (the insect of God), *Ngochana* (the weakest calf)—one needing protection of everyone surrounding him yet he is everything. As with Mamati (2024), from childhood, every member of the society is taught customs for protecting the landscape, thereby protecting the *Ngochana*. He is the unifier, the link to *Nyambe* (God). The wealth of the Litunga is not material accumulation per se, but all that is under the earth. He is the co-ruler with predecessors who are continuously consulted on key decisions by the *Lingomboli* (priests)—those with eyes. The *Lingomboli* tend the burial sites of predecessors and perform unseen duties (not in the public domain) and communicate spiritually.

Oral histories from our participants reveal diverse but important myths surrounding the origins of the Lozi tribe. One belief is that the tribe starts with *Nyambe* (the sun god) who descends from the heavens into the Barotseland (Kapambwe 2018). *Nyambe* is displeased with *Kamunu* (the human being) for killing his children—animals and fish. *Nyambe* is unhappy when humans kill his own creation and returns to the unknown. Here, *Nyambe* effectively stamps the relational and conservationist identity of the Lozi, including spiritual attachment to landscape (see also Mamati 2024 in this Special Issue). Interviews with one *Induna* (chief’s representative) as one of the knowledge holders reveal *Nyambe* is the maker of everything, including the earth. The Lozi-speaking people believe in him, but do not see him. He is known as ‘he who does not talk’, somebody you do not speak to directly, the highest God.³ For the Lozi-speaking people, the centrality of natural resource management points to this wisdom. This cultural and spiritual value links the Lozi with their ‘God and environment.’ Taboos and myths have been used to restrict the use of natural resources. The *Lingomboli* can speak with the god of rain to calm the weather, including storms and heavy waves in the Zambezi River. Protection of species follows clear beliefs. There are trees, forests and certain species for the *Litunga/Ngochana*—and no one should be found harvesting these. This includes islands—breeding spaces for various species—along the Zambezi River. For instance, some plant species with utilitarian value are not allowed to be cut without permission from the *Litunga*. There are taboos and myths related to poaching (for example, eland, lion and leopard), and spiders, pythons, fish (for example, perch/*mbunda*); (silver catfish/*lubango*) and plants. As part of the

³ *Kuamba* = talk; *Amba* = talk; *Nyambe* = who does not talk.



Figure 1. The *Litunga*'s boat/berge—known as *Nalikwanda*—during the *Kuomboka* ('get out of water') ceremony. The ancient ceremony celebrates the move of the *Litunga* from his summer home 'Lealui' in the flooded villages of the Barotse floodplain to his winter home in *Limulunga* on the higher ground. The *Litunga* stays there until the flood subsides (photograph: Mizinga Mahalihali 2023).

Litunga's species, 'the tail of the eland forms part of the instruments of power. Any sick or dead animal should be reported' (Induna 2024). Eating habits such as around consumption of eggs of birds and hunting of geese or crocodiles require permission (Milupi *et al.* 2020).

There is evidence that communities deploy diverse strategies to navigate climate challenges, revealing a deep sense of local ecological knowledge about their environments. Intra-community and intra-household relationships are crucial during *munda* (floods) and *linanga* (drought). Reliance on alternative sources of firewood to avoid deforestation, such as using *man'ele* (ligneous grass); changing seed regimes for crops such as cassava; seasonal movement of cattle from the floodplains during floods to the upper land and back to the floodplains when water levels subside are part of Lozi traditional practices. The plains experience flood inundation annually and people tend to move to the upland in the rainy season and then come back to the floodplain when the inundation recedes. *Kuomboka*—meaning 'to get out of water'—celebrates the move of the *Litunga* from his compound at *Lealui* in the Barotse floodplain to *Limulunga* on higher ground. The return trip is usually held in August with a less publicised journey called the *Kufuluhela*. Livelihoods among the Lozi are intricately linked to these environmental dynamics (Figure 1).

Over time, community members engaged in migratory practices across seasons, practised agroforestry and management of degraded farming areas and elements around ecosystem services and resource utilisation. Meanwhile, *kuloba*

*sitaka*⁴—a collective bird cropping exercise—ensures sustainable harvesting of birds along the Zambezi River, avoiding overexploitation. Here, certain sanctuaries are designated for harvest on a particular day. *Kutulisa*—rotational grazing—allows regeneration of vegetation and avoids overgrazing (Milupi *et al.* 2020). There are strategies around the role and importance of social networks and relational wellbeing, spirituality and taboos, including rainwater harvesting and rainmaking. In some cases, changing consumption patterns were also applicable (see also Makondo & Thomas 2018). All these elements relate deeply to wisdom, techniques and practices relied upon over many years and ones that remain relevant today. However, these have been peripheral to donor-driven interventions, raising challenges for the sustainability of climate interventions.

When good intentions are not enough—CDCA designs and climate needs

Participants across the selected donor projects clearly identified climate change links as relevant intervention areas. Although one key informant argued: *‘a clear understanding of these climate risks has allowed selection of appropriate sub-projects’* by the participants (Provincial Respondent, 2022), analysis reveals that actual project selection was shaped largely by the Participatory Adaptation Implementation Manual and the guidance of district and provincial level officials—also known as Climate Risks and Adaptation Facilitators (CRAFTS)—and not ILK systems. CDCA was supposed to leverage on ILK in the design. The ‘community’ in the CDCA is supposed to mean integration of local knowledge and agency. However, actual implementation structure privileges project and funding guidelines/interests, with local groups integrated only as holders of sub-grants (Figure 2). We found no clear pathways through which the design examined ILK and awareness of climate change and related environmental risks. Also missing were conversations about the local framings of vulnerability—one we find to be a fluid concept among the Lozi. This is worsened by projects being too small to generate meaningful livelihood impacts, resilience and improve incomes (for example, gardening or tending livestock) (Figure 2).

Analysis revealed inadequate integration of ILK into the type of projects necessary in host communities—ones that can respond to the perceived level of vulnerability and build on previous traditional practices. Material and lived aspects of human culture, including shared narratives did not form part of the central organising elements of CDCA (see Manda 2023). Instead, project implementers relied on the project implementation manual as the central mobilising feature of community projects (Figure 3).

A focus on the project implementation manual placed donor funds and decision making in the hands of community members, *‘as long as this is within the project requirements’*. And that in so doing, *‘this approach strengthens*

⁴*Kuloba* = to break/destroy; *Sitaka* = heap of reeds.



Figure 2. Implementation structure of the CDCA projects (authors).



Figure 3. Donor-funded solar-powered small-scale garden irrigation system (photograph by Chrispin Matenga).

community voice to demand greater accountability of themselves and the institutions that are relevant to strengthening livelihoods' (District Project Officer, 2022). However, community voice in the project relates to decisions by

committees. As a result, local groups rarely called for greater accountability even within their own groups or committees—even when suspicions of financial misappropriation emerged. This misalignment is crucial for the sustainability of adaptation projects. Consequently, participants failed to explicitly steer the project in their own direction. Procurement of project services was frequently cited as difficult for members to navigate due to committee members dominating decision-making, and non-availability of procurement and support services locally. In most cases, wider group members (outside project management committees (PMCs)) were excluded from key procurement and project decision-making, raising suspicions of capture. These processes can thus be disempowering. One *Induna* expressed an opinion that CDCA designs including other interventions, such as those related to wildlife protection, have tended to tamper with preexisting traditions rather than build on them, and that the Lozi-speaking people face constant political pressures (see also Manda & Banda 2023).

Marginality of indigenous and local knowledge

We reflect on the centrality of the CDCA project approach across two broad spheres and how this leads to the marginality of IKL.

False narrative of CDCA as empowerment of communities

National and district interviewees frequently argued that CDCA was an empowering exercise, but empowerment itself was narrowly framed around project management and funding aspects. We found three important elements.

The first frame relates to *group formation and selection of sub-projects*. CDCA arguably enabled selection of sub-projects based on community consultation. However, sub-projects were identified by and through pre-existing local groups during participatory planning processes for climate risk and adaptation, assisted by CRAFTs. Some government officers argued that local communities' involvement in what was characterised as participatory planning processes allowed community members themselves to analyse climate risks, prioritise problems and select responses as '*shared goals*' (PPCR Interview, 2022). Empowerment is framed around group participation as opposed to processes and capacity across groups, including intra-group negotiations of resource rights and integration of IILK. This is even though selection of projects built on pre-existing groups (for example, Village Savings Groups or Cooperative groups). Processes did not produce new cohorts based on local framings of climate risks and vulnerabilities. Project implementers justified this as enhancing continuity, allowing opportunity to build on pre-existing 'workable' partnerships, and enabling ownership. However, previous groups were not mooted as strengthening climate resilience. Interestingly, rather than integration of IILK, project implementers were concerned that groups continued to express a general lack of business culture and market awareness in CDCA sub-projects. Consequently, groups continuously face governance challenges, affecting sustainability of the projects.

Second is *resources distribution to community groups—decentralisation logic*. Across the sub-projects, the CDCA approach granted participants direct access and control over planning decisions and investment resources, but these centred on pre-approved projects. Whereas project management committees (PMCs) were solely responsible for the withdrawal of sub-grants, interviews revealed a lack of capacity among grantees to sustainably utilise the funds. A quick decision to include district-level technical staff as signatories to some of the project bank accounts highlights the lack of capacity. We found financial accounting challenges across all projects. In Kaoma's Lunyati North Drip Irrigation Project, group discussion revealed disagreements between members and the treasurer on record keeping. Whereas the treasurer claimed there existed records of all activities, members were not privy to these records (similar to experiences in Kazungula's Puzukwa Irrigation Scheme). Members had little information on how much the project cost, arguing, '*when it comes to money, it is the chairlady who knows about that*' (FGD Participant, 2021). This shows that the flow of resources to community groups did not automatically translate into improved downward accountability.

Third is *inclusive governance mechanisms*. CDCA is often credited with building transparency and accountability. However, projects assumed homogeneity in the governance process, although '*membership include[s] people living with HIV, widows, and the aged*' (FGD Interview, 2021). Analysis reveals an uncritical reflection of the basis and terms on which local groups/individuals were included in these projects, including what they are able or unable to do.

Narrow perception of capacity building

CDCA has been promoted as pathways to building local capacity across two areas. First is *financial management and procurement*. Generally, disbursement of funds to sub-projects is through a project bank account depending on accountability of previous disbursements. Participating groups were trained in basic financial literacy and accountability. While it is a requirement for committees to produce regular financial reports, many group members did not receive regular updates on finances. Analysis revealed that across projects, financial matters were poorly communicated to group members. PMCs organise, plan, implement and account for funds, including procurement of goods and services (operations and management). They procure goods and services for the community sub-projects. However, community groups still relied on District Officers in advertising for and procuring small works or services at community level. While some PPCR technical experts help monitor projects, services from government line departments, such as Water Engineering, Veterinary, or Agriculture, and in some cases agro-dealers, were missing, leaving projects poorly supported. Thus, the majority of sub-projects required continued technical and non-technical support (for example, water point committees and related tap attendants and pump operators), but these requirements added an extra layer of work for communities supposed to be adapting to climate change. The so-called community-level groups became embedded in the government

procurement chain and bureaucracy. In some cases, participating groups procured faulty products, affecting implementation. Examples include non-durable solar pumps and faulty installations that leave community groups without water for project activities and non-durable pond liners for some fish farming sub-projects.

Some of these relate to inadequate funding to line departments, which affected backstopping activities. District government officers revealed a lack of financial resources to undertake frequent support and extension services (for example, transport). As a result, CDCA project activities in some cases were treated as auxiliary activities even where projects had been handed over to support line ministries. In Kazungula, one District Administrative Officer argued *'operational funds from the project office are insufficient and sometimes inconsistent for us to offer continued support'*. Given that funding support was given to District staff and was complementary to already existing government funding, officers expressed opinions that more sensitivity about the role and importance of field-level Government Extension staff closer to project sites was needed. There are several examples of poor support from government departments. The study finds irrigation projects such as Mwandu Irrigation Scheme had poor links and support from the Department of Water Affairs, as water systems were not working to capacity. The project has four water tanks each with a capacity of 10,000 litres, but faulty designs by the private contractor meant that only two tanks were filling up (20,000 litres) to capacity, leading to drying of crops and underutilisation. Whereas the named contractor was supervised by the Department of Water Affairs, the department itself struggled to offer after-services. Failure to operate to full capacity further discouraged group membership and group-based adaptation activities. There are similar experiences in projects dealing with livestock (for example, pigs, goats and chickens) where members complained their animals either died or were diseased—placing blame on the Department of Veterinary Services. The Department of Fisheries was also cited as offering insufficient support. Overall, and for most part, capacity building appears general as opposed to climate and livelihood related capacity building that capitalises on cultural skills and practices.

How can ILK be organised to expand inventories of adaptation possibilities?

We asked study participants at what point CDCA strengthens climate resilience. Officers argued that CDCA provided relevant needs assessment, including aspects of climate-resilient activities as *'key intervention areas for climate change adaptation by grantees'* (District Interview, 2022). They added that it finds relevance in localising a problem-solving approach which speaks to 'real' climate risks faced by communities. However, which problems were being addressed and for what vulnerabilities was less clear. This shows that currently donor-driven CDCA is technically inadequate to address climate resilience from

a social and cultural perspective. Some national experts within NPCU agreed *‘with CDCA, communities do not have all the technical know-how and expertise to find effective solutions to local challenges’*. Analysis reveals that CDCA projects did not fully recognise the role and importance of ILK in the design and implementation of projects. Analysis reveals CDCA did not sufficiently enable local structures to be effective in addressing climate needs and integrating ILK. A reliance on local structures such as Ward Development Committees reveals the mismatch between project expectations and challenges on the policy–ILK intersection.

Marginalisation of ILK means that local needs are poorly articulated, and projects are poorly linked to local perceptions of vulnerabilities and response pathways. For instance, in some parts of the western province and among the Lozi-speaking people, floods are not perceived as a source of vulnerability but as an opportunity as they have over time found adaptation pathways through migratory practices. CDCA arguably enhances efficiency and cost-effectiveness where funds are remitted directly into beneficiary accounts, and where *‘financial management guidelines are strictly adhered’* (Mwandi FGD 2022), but this effectively takes away a layer of responsibility from project developers and government officers and places it on community members.

Our analysis reveals that the application of the CDCA faces four main challenges. First, despite devolving responsibility to procure goods and services at local level, there are still some capacity challenges in this area. Second, majority projects are mooted in isolation to other critical support resources and services, such as water and extension services (for example, Lyambayi Piggery Project in Sioma District and Matoka Women’s Goat Project in Kazungula District), limiting engagement with different knowledges. Third and related to the second is that there is little coordination on technology issues between local communities and support service organisations. Small-scale water infrastructure projects have relied on solar-powered technology to abstract water, for which the participating communities demonstrated limited knowledge about technical specifications of the equipment itself or backup maintenance. Finally, the scale of most CDCA sub-projects reviewed is too minute to engender meaningful adaptation, livelihoods and resilience. Sub-projects frequently registered low production for the kind of effort and resources expended on the community groups. These elements remain peripheral to climate adaptation needs, meaning the introduction of CDCA might have a devastating impact on socio-cultural dimensions of wellbeing.

The potential to expand inventories of possibilities for adaptation at the policy–ILK interface exist and is crucial for sustainability and equity of adaptation measures, but this is hindered by design elements that continue to privilege scientific knowledge and technical assumptions of adaptation. CDCA ignores the centrality of landscapes—scenery, history and culture that shapes human–nature relations (see also Mamati 2024). In Sioma District, for instance, participants are in partnership with the Ministry of Agriculture to receive weather reports from the Zambia Meteorological Department. As one key informant argued, *‘farmers are able to consult the department of agriculture for*

the interpretation of weather data’ (Interview Sioma, 2022). However, in most areas the CDCA did not lead to progressive and relevant partnerships that could help build on existing productive activities as part of ILK. In Mwanzi District, participants expressed opinions that *‘there is need for a technical expert to look at our water challenges’*. There are also calls for partnerships in Kaoma District on fish seed production and Nkeyema District on support to curb poultry diseases. These avenues can help intersect policy and ILK and expand adaptation possibilities for local people.

Final reflections

This article aimed to explore the integration (or marginality) of ILK in donor-driven climate adaptation projects among the Lozi-speaking people of western Zambia, and how this limits inventories of adaptation possibilities. We argue there is no single-purpose institution necessary to drive climate adaptation and livelihood resilience, but a variety of institutions of varying influence. CDCA may present false assumptions of being locally driven, and may represent another epistemic injustice against local groups supposed to be adapting to the challenges of climate change. What can we realistically expect when interventions look uncritically at traditional practices in communities supposed to be adapting to climate change? There are questions about the processes required to effectively intersect scientific perspectives and ILKs—a feature for new research. However, some of these relate to co-production in project formulation, design and implementation (Reyers *et al.* 2015). Definitions of vulnerability and cultural appropriateness of climate adaptation measures depend on material and lived aspects of human culture, including community meanings and resilience, as shown by values, sense of place, power and shared narratives. This article shows that some of these elements present in the Lozi’s rich ecological knowledge remain peripheral to CDCA, and that ILK can greatly help to expand the realistic scope of adaptation, its effectiveness and its specificity in local contexts. For this to happen, genuine intentional processes and pathways for integrating ILK are needed, acknowledging climate adaptation as a set of difficult political and economic choices to be negotiated socially and culturally. Of course, this is not a call for a generic integration of ILK into climate change adaptation policies and actions (Omukuti 2020), but one that adopts a cautious and prudent strategy in projects implemented in local spaces.

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Appendix

Typology of reviewed sub-projects and their level designed by projects funders (Government and World Bank). The GRZ PAM separates infrastructure sub-projects, support to farm level systems intended to improve sustainability of rural livelihoods.

Table 1. Typology of reviewed sub-projects and their level.

District + Project name	Type of Project	Community
1. Nkeyema		
• Luteye Village Chicken Project	Soft adaptation	•
• Lumeyo Village Chicken Project	Soft adaptation	•
• Swalisano Village Chicken Project	Soft adaptation	•
2. Kaoma		
• Namalazi Fish Feed Center	Small-scale infrastructure and soft adaptation	•
• Lunyati North Drip Irrigation Project	Soft adaptation	•
3. Luampa		
• Luampa Goat Breeding Centre	Small-scale infrastructure	•
• Kamongwa Piggery Project	Soft adaptation	•
• Pangeni Lika Animal Draft Power Project	Soft adaptation	•
4. Mongu		
• Kupangela Hamo Fish Farming Project	Small-scale infrastructure	•
• Mutahe Poultry, Gardening and Water Project	Soft adaptation and small-scale infrastructure	•
• Shenya Ubeleke Piggery Integrated Project	Soft adaptation and small-scale infrastructure	•
5. Sioma		
• Tiseza Gardening and Goat Project	Soft adaptation and small-scale infrastructure	•
• Lyambia Piggery Project	Soft adaptation	•
• Alushenyeniti Integrated Project (Piggery, Gardening, Fish Farming and Water Reticulation)	Small-scale infrastructure and soft adaptation	
6. Mwandu		
• Evergreen Irrigation Scheme	Small-scale infrastructure	•
• Mwandu District Irrigation Scheme	Small-scale infrastructure and soft adaptation	
• Londo Poultry Project	Soft adaptation	•
7. Kazungula		
• Lwizi Fish Farming Project	Soft adaptation	•
• Matoka Women Goat Project	Soft adaptation	•
• Mpuzukwa Water Project	Small-scale Infrastructure	•

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