

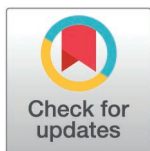
RESEARCH ARTICLE

Coupling human development and adaptation through enhancing adaptive capacity and equity in climate change adaptation projects: Insights from practitioners in Ghana, Kenya, and South Africa

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Abstract

The impacts of and the ability to respond to climate change are closely intertwined with poverty, inequality and inequity. Addressing the underlying development and structural causes of vulnerability must, therefore, go hand in hand with efforts to reduce climate risk and impacts. However, there is relatively little research on how best to achieve this in practice. The growing number of place-based climate change adaptation interventions provide an opportunity for empirical research on how these projects contribute to the livelihood security and climate resilience of vulnerable and marginalised groups. We used a composite framework to guide our research questions and analysis drawing primarily on the notions of specific and generic adaptive capacity, and three dimensions of equity, namely recognitional, procedural and distributional equity. We undertook 37 online interviews with practitioners from adaptation projects in South Africa, Ghana, and Kenya. Interviews covered, firstly, project activities related to reducing climate risk and building livelihoods (providing insights into how projects develop specific and generic adaptive capacity and for whom); and secondly, the processes employed to incorporate local knowledge, values and practices, ensure inclusivity and transparency, and benefit marginalised groups (giving insights into how equity is promoted). Our findings provide evidence to show that, while most projects focussed on actions to reduce climate risk and impacts (specific adaptive capacity), numerous activities also contributed to building generic adaptive capacity, especially where integrated approaches that supported livelihood diversification were employed. Endeavours to reduce inequity were observed across all projects through, for example, targeting marginalised groups, building on local practices and priorities,

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and being cognisant of the need to be inclusive through ‘gender sensitisation’ workshops, use of participatory methodologies, and ensuring transparent governance processes. Overall, the findings provide a useful foundation and set of learnings to develop further towards more equitable adaptation.

Introduction

The impacts of and the ability to respond to climate change are closely intertwined with poverty, inequality, and inequity [1]. Individuals and groups who face intersecting inequities due to discrimination based on gender, disability, race, ethnicity, economic status and age, among others, tend to have limited access to assets, little voice, agency or power and low adaptive capacity [2]. Consequently, they are disproportionately impacted by climate change and the least able to adapt [3,4]. Tackling the underlying social-cultural, developmental, and structural drivers related to persistent poverty, inequality, and inequity, therefore, must go hand in hand with efforts to reduce climate risk and impacts [5,6]. A sustainable future depends on securing the well-being of all [7,8]. Reducing inequality and inequity is thus critical for sustainable development, poverty reduction and effective climate change adaptation [9,10].

However, despite increasing acknowledgement of the importance of centring human development, equity and justice in climate change adaptation [1], as well as a growing literature in this area [11], several commentators argue that these critical social considerations are still not receiving adequate attention in scholarship and practice. For example, Eriksen and colleagues [5] highlight how many adaptation interventions fail to adequately benefit marginalised members of communities and that some actions may “inadvertently reinforce, redistribute, or create new sources of vulnerability” (pg. 3). These authors further contend that climate change adaptation projects tend to focus on technical or economic outcomes and/or cost-effectiveness, rather than their broader social impacts, the consequences for vulnerability, poverty, inequality, and inequity and, accordingly, sustainable and climate resilient development (also see [12]).

Part of the problem has been the neglect of attention to ‘process’ as a key mechanism for enhancing equity and justice in adaptation interventions, such that issues of power and links to poverty, inequality and inequity remain largely under-acknowledged [13]. Bentz *et al.* [14] suggest that consideration of what they term the ‘manner’ (relating to ‘the way’ or process) in which adaptation is tackled is critical to prevent the reproduction of pre-existing inequities and to ensure transformative change. Similarly, Eriksen *et al.* [5] mention that the achievement of equitable adaptation is diminished by insufficient understanding of contextual vulnerability and inequitable participation in planning and implementation of projects. Furthermore, many climate change interventions are implemented through existing neoliberal planning processes and regulatory mechanisms that tend to favour elite interests and disregard the needs of vulnerable groups [13]. This process of working within the status quo has been termed ‘retrofitting’ by Eriksen *et al.* [5]. Consequently, it is not

surprising that marginalised members of communities have limited say in the adaptation decisions that affect them [13]. Indeed, Moser *et al.* [15] argue that when climate change projects are co-opted into unsustainable development agendas, limited opportunity exists for addressing future climate risk and the socio-environmental causes of vulnerability since the very conditions and factors that contribute to existing vulnerability are not questioned nor challenged.

Given the lack of focus and evidence on how aspects of human development, and equity in particular, can be included in adaptation actions and projects, in this study we explored whether and how rural placed-based climate change adaptation projects in three African countries (Ghana, Kenya and South Africa) contribute to reducing climate and non-climate related vulnerabilities to result in more equitable and resilient adaptation. We were especially interested in unpacking and understanding the activities and processes employed by projects to include and benefit marginalised community members in ways that enhance their livelihood assets and well-being while increasing their ability to adapt to climate change.

In framing our study, we combined an understanding of generic and specific adaptive capacity [6,16] (including how these relate to development and adaptation, [17]) with a multi-dimensional typology of equity that considers recognitional, procedural and distributional equity [7,18] (Fig 1). Applying this composite framework in our interviews and analysis enabled us to systematically assess 1) the activities that build generic and/or specific adaptive capacity, including for whom (distributional equity); and 2) the processes employed to recognise local knowledge, culture and rights (recognitional equity) and to strengthen fairness and transparency (procedural equity). From the interviews we were able to distil out the activities and processes that reduce inequities, benefit and build the generic and specific adaptive capacity of marginalised community members, and help move the 'status quo' towards more inclusive coupled adaptation and development [8].

In the next section, we provide a fuller description of our framework, and its various components. This is followed by an explanation of the approach and methods we used. For the results, we firstly provide findings related to the activities identified from the interviews that build generic and/or specific adaptive capacity, especially for marginalised groups. We follow this with a description of the processes employed by projects to incorporate the three types of equity, as well as the outcomes of these processes. In presenting the findings, we share encouraging quotes and stories to illustrate how adaptive capacity for vulnerable groups was built or where greater equity was achieved, offering valuable insights into how adaptation projects can promote poverty reduction, equality and equity while simultaneously reducing climate risk. In the discussion, we focus on these insights and learnings and reflect on both the usefulness of the framing we used, highlighting interconnections between the different components, and the ways in which adaptation projects can tackle underlying vulnerabilities. We end with some concluding points.

Framing

To assist with the framing and conceptualisation for this study, we scrutinised the literature and conceptual thinking from the last 15–20 years on the human dimensions of climate change, focussing on the links between climate change and development, poverty, inequality and, more recently, equity, social justice, and transformation [19]. From the understandings gained, we selected four frameworks/concepts to scaffold and guide our research, namely the revised sustainable livelihoods framework [20], the concepts of specific and generic adaptive capacity that link climate change, livelihoods, and development [6,16,17] and lastly the equity framework put forward by Leach *et al.* [7] (Fig 1) (also see [21]).

Recognising that development and climate action need to be synergistic for climate resilience, we drew on the well-known work of McGray *et al.* [17] on linking climate change and development (Fig 1, 1). In their representation, these authors separate 'vulnerability to' and the 'impacts of' climate change along a continuum, with the left-hand side of the continuum orientated towards activities that tackle drivers of existing vulnerability such as poverty and inequity, while the right-hand side is about activities that reduce the specific risks and impacts of climate change. These two sides relate well to the notions of generic and specific adaptive capacity as conceptualised by Lemos *et al.* [6,16] (Fig 1, 2). These authors define specific adaptive capacity as manifestations of the ability to respond to and manage an identified climate

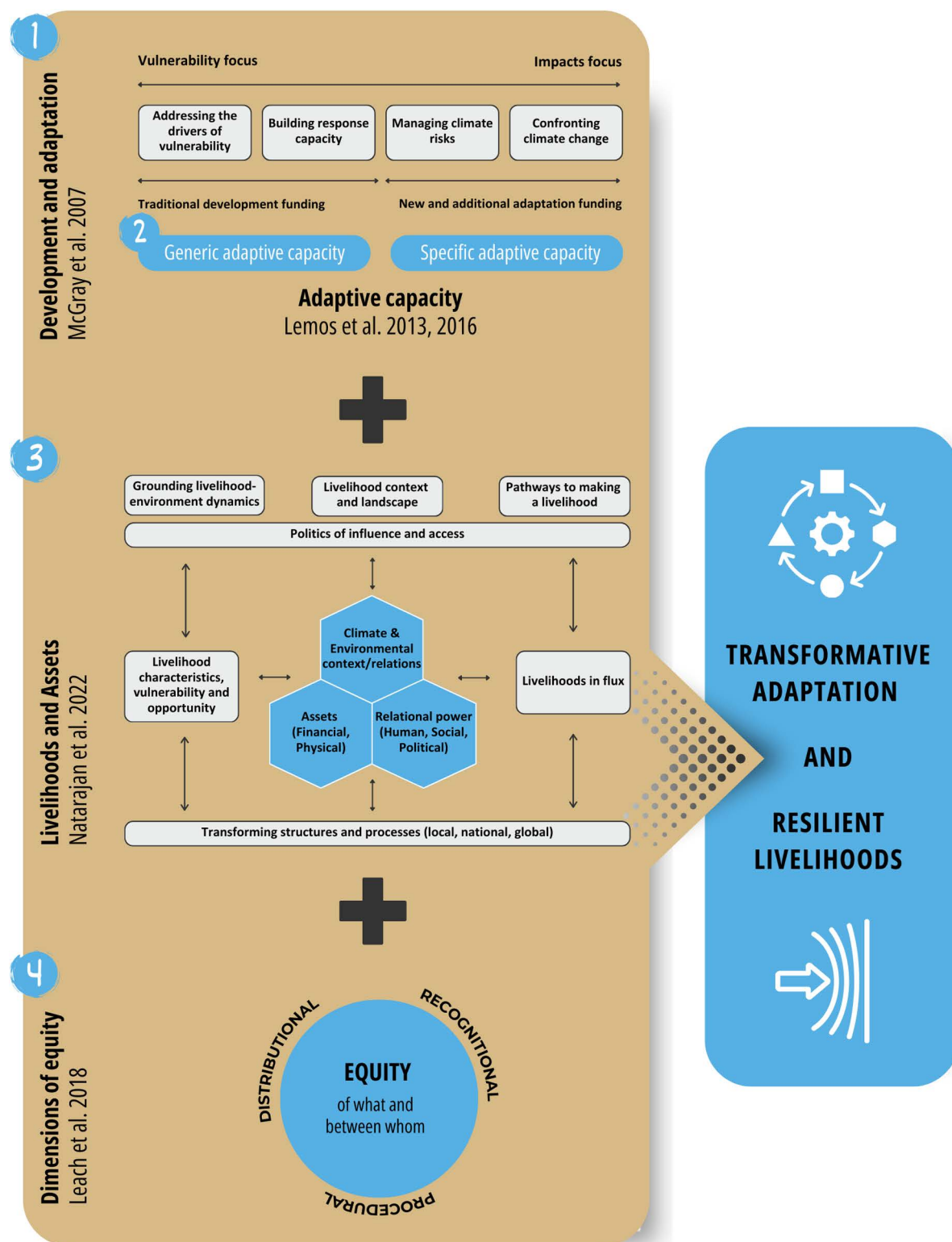


Fig 1. Composite framework used to explore adaptive capacity and equity in place-based climate change adaptation projects. We combined elements from four frameworks related to climate change and development, labelled as 1 – 4 (sources provided). Together, they help inform progress toward achieving the desired transformative outcomes of equitable adaptation and resilient livelihoods.

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hazard (through for example using climate forecasting, early warning systems) while generic adaptive capacity refers to the ability to respond to a range of social, economic, political, and ecological stressors (which requires income, access to education and health, physical assets, social capital). Essentially generic adaptive capacity is about building the full range of livelihood assets and capabilities needed for a sustainable livelihood (Fig 1, 3) [22]. If levels of generic capacity are too low, then people will struggle to respond to climate impacts and could become trapped in a vicious cycle [16]. Both forms of adaptive capacity thus need attention in adaptation projects for equitable and resilient outcomes. Similarly, both sides of the McGray *et al.* [17] continuum are considered essential for adaptation as confronting climate specific impacts alone will not change the underlying drivers of vulnerability [23]. Adaptive capacity is thus linked to levels of development, and implementing sustainable development, in turn, supports adaptation [12]. However, despite recognition of these linkages, Lemos *et al.* [6] argue that “the relationship between building adaptive capacity, development policy (especially anti-poverty programmes) and climate risk management has remained critically under-theorised and studied” (pg. 70).

The equity typology proposed by Leach *et al.* [7] and other researchers [18,24,25] (drawing on theories of justice [26–28] and earlier work by Fraser [29,30]) provides a useful way to look at process and outcomes [14] in relation to marginalisation and vulnerability in adaptation projects (Fig 1, 4). The authors recognise three dimensions of equity that they believe need to feature in any project to ensure fair and just outcomes, namely distributional, recognitional and procedural equity.

Distributional equity relates to “how resources, costs and benefits are allocated or shared amongst people and groups” [7] (pg. 4). Distributional equity is thus about who is involved in adaptation projects (beneficiaries), including how they are selected. The latter will determine who ultimately benefits from different adaptation activities. Recognitional equity refers to “acknowledgement of and respect for identity, values, knowledge and associated rights” [7] (pg. 4). Thus, it is essentially about ways of recognising and responding to local peoples’ adaptation needs and priorities, especially marginalised members of society, while simultaneously respecting cultural contexts and local knowledge systems. Procedural equity highlights “how decisions are made, and the extent to which different people and groups are able to influence these or have their perspectives represented or incorporated” [7] (pg. 4). Hence, of interest are the processes by which different social groups from the local community are included in project design and implementation and the governance structures that influence such participation.

Methods

Our study formed part of a larger research project entitled “Towards Transforming Social Inequalities through Inclusive Climate Action” (TSITICA) (<https://tsitica.uct.ac.za/>). Due to the timing of the project, both the COVID pandemic and resultant funding cuts precluded our original plan to interview community beneficiaries in the field. Instead, we undertook online interviews with project implementers and evaluators (whom we have collectively termed practitioners) of rural place-based adaptation projects (S1Table) in South Africa, Ghana, and Kenya (where project partners are based). All three countries are significantly impacted by climate change and have high levels of poverty and inequality [1,31]. While there are some differences in climate risks and the manifestation of poverty and inequity for each country, all three have seen a rise in climate action allowing us to identify suitable projects to investigate from a systematic database of reported climate change adaptation projects for the period 2000–2020 created under another Work Package of the TSITICA project.

From the list of suitable projects (which met our criteria of rural, recent and place-based), we approached practitioners for whom we had contact details and sent them an email invitation for an interview (which included the interview guide and an informed consent form). Based on positive replies, and some follow-up telephone calls, we were able to recruit 33 projects (12 in Ghana, 10 in Kenya, and 11 in South Africa). Most of these projects were implemented by non-government organisations (NGOs) (23), while 10 were implemented by local (1) or national government (9) (S1 Table). We conducted 37 interviews across these projects, since for four projects we were able to also speak to project evaluators.

Guided by our composite framework ([Fig 1](#)) we developed an interview protocol to explore: 1) the types of project **activities** that reduce climate risk and impacts (i.e., build specific adaptive capacity) and those that enhance livelihood assets and human development (i.e., build generic adaptive capacity); and 2) the **processes** used in projects to facilitate incorporation of local knowledge, values and practices (recognitional equity), to ensure inclusivity and transparency (procedural equity); and to select project participants (distributional equity). We also investigated the challenges faced in project implementation and invited practitioners to share stories of transformative change and lessons learned; these are not covered in this paper. The interviews took between 1–2 hours each.

Interviews were transcribed (through carefully editing Microsoft Teams transcripts alongside the recordings) and imported into the qualitative data analysis computer software package NVivo for thematic analysis. We started with a high-level deductive analysis based on our conceptual framing. The coding allowed us to separate project activities and processes in terms of whether they built generic and/or specific adaptive capacity and promoted different dimensions of equity ([S2 Table](#)). Our second step involved a manual inductive analysis where we looked for emerging themes and patterns within the coded material to build a narrative on how projects are building adaptive capacity and embedding equity. We also selected quotes and stories that surfaced how practitioners engaged with poverty, inequity and vulnerability reduction in their projects.

Ethics statement

We obtained ethical approval for the study from the University of Cape Town, Faculty of Science Ethics Committee on 25 January 2022 (approval code FSREC 003 – 2022). We received informed consent in writing from practitioners prior to the interviews. We presented the key findings back to practitioners in an interactive online workshop to which they were all invited in July 2023. We also developed a series of short briefs covering the central lessons from the research that we shared with all practitioners. Interviews were conducted over the period 4 November 2022–7 June 2023. Original transcripts are saved on a University of Cape Town password and verification protected Microsoft 'One Drive' to which only the authors have access. These transcripts were imported into NVivo and given their own unique identifier ([S1Table](#)). De-identified transcripts are available from the University of Cape Town research repository – Ziva-Hub (see link provided).

Findings

Activities that build adaptive capacity

In this section we describe the range of activities reported across projects and how they build generic and/or specific adaptive capacity and for whom. We classified activities into seven empirically grounded categories identified from the inductive thematic analysis and use these as subheadings to organise and report our research findings.

Overall, our analysis shows that, although only a handful of projects (9) explicitly set out to address existing vulnerabilities and their root causes, many of the activities aimed at reducing climate risk and impact were also able to enhance generic adaptive capacity. For example, they helped, directly or indirectly, to strengthen livelihood assets, especially financial, human (including agency), and social capital, with some examples of physical capital (infrastructure development) and natural capital (landscape restoration). [Table 1](#) summarises the key activities described in the narrative below.

“So, it was a three-way approach which included awareness creation, training in new farming practices and providing infrastructure. The idea was not providing interventions that were mainly for human development, but the indirect benefits were expected to address poverty and reduce social risks” (13G).

Activities reducing climate impacts in farming systems. Reducing the risks and impacts of climate hazards on farming and other land uses was a major area of focus for all projects. The primary climate hazards addressed were

Table 1. Range of activities mentioned in interviews that build adaptive capacity. The classification of activities (type) and the activities themselves emerged from an inductive analysis of the interviews. The outcomes illustrate how the various activities help to build specific and generic adaptive capacity.

Type of activity	Activity	Outcomes of activity	
		Specific AC	Generic AC
Reducing climate impacts in farming systems	<i>Climate smart agriculture</i> • Agronomic technologies – nutrient management, spacing • Minimum tillage • New varieties and crops • Fire belts • New cropping systems, intercropping and crop rotation • Training and demonstrations, phone apps, exchange visits, TV shows	Increased crop and livestock resilience Improved yields	Food security Income
	<i>Climate information services</i> • Phone apps • Radio programmes	Increased crop and livestock resilience	
	<i>Agroecological practices</i> • Local inputs • Traditional varieties, crops, breeds • Own seedlings and suckers • Revitalisation of traditional practices • Organic production • Tree planting/agroforestry • Women's crops • Live fencing • Seed banking • Enhancing ecosystem services (nature-based solutions) • Training - manuals, demonstrations, phone apps, exchange visits, TV shows	Increased crop and livestock resilience Improved yields Enhanced ecosystem services Reduced dependency on external suppliers	Self-reliance Agency Savings Improved livelihood assets Recognition equity Equity in access to new practices Women's empowerment
Promotion of agro-processing and value addition	<i>Development of value chains</i> • Organic production • New breeds • Linking with private sector (especially those supporting women's empowerment) • Local processing • Collective production and marketing (cooperatives, associations)		Improved income Improved livelihood assets, especially social capital Collective agency Business and negotiation skills Enhanced capacity
Landscape level activities	<i>Natural Resource management</i> • Rangeland restoration • (seeding, seedbanks) • Wetland restoration • Invasive species removal • Sustainable harvesting • Alternative/additional livelihood activities targeting women and youth	Enhanced ecosystem services Less dependence on climate sensitive agriculture	New livelihood options/diversification (payments for ecosystem services/carbon, wild product commercialisation) Women and youth empowerment New sources of income
Infrastructure development	<i>Water supply</i> • Boreholes • Dams • Solar pumps • Dugouts and pans (for livestock) • Micro-harvesting • Training in water conservation and harvesting	Improved water security Water conservation Increased crop and livestock resilience	New livelihood options (fish farming, vegetables) Saving time for women
	<i>Other Infrastructure</i> • Local processing units • Seed and pasture stores • Bridges	Increased crop and livestock resilience Flood resilience	Value addition and improved income and livelihoods Access to health and education services and social connections

(Continued)

Table 1. (Continued)

Type of activity	Activity	Outcomes of activity	
		Specific AC	Generic AC
Access to finance	<i>Savings and lending clubs</i>	Insurance against climate risks	Savings – financial security Money for large purchases (water tanks) Support for alternative livelihood activities/small scale businesses Women's empowerment Enhanced equity
	<i>Digital payment systems</i>		Efficiency and savings
Building social relations	<i>Structures</i> • Cooperatives • Self-help groups • Community trusts • Committees (related to specific livelihood activities) • Linkages to sub-national government structures	Foundational to success of activities relating to climate risk which involved collective work	Enhanced social capital Bottom-up decision making Participatory governance Enhanced equity - procedural equity Collective action Voice and influence
	<i>Training</i> • Training in participatory governance, conflict management, participatory planning • Climate change awareness building • Participatory vulnerability assessments	Improved understanding of climate risks	Participatory governance Enhanced equity especially procedural equity Collective action
Non-climate related vulnerability reduction	<i>Partnering with other organisations working in community development</i>		Improved livelihoods Improved health and nutrition
	<i>Developing new proposals related to non-climate community needs</i>		Improved livelihoods Improved health and nutrition
	<i>Citizen science (e.g., water quality monitoring)</i>		Improved health and nutrition

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drought and flooding, with more projects focused on drought as all three countries have extensive arid and semi-arid regions. Since the selected projects are rurally based, activities to address these hazards and build specific adaptive capacity focused primarily on increasing the resilience of crop and livestock farming and ensuring water security, with a few projects also including sustainable natural resource management and landscape restoration. Alongside this, raising awareness of the impacts of climate change, provision of weather stations and affording access to climate information and services (e.g., developing early warning systems) to support farming decision-making were key components of many projects. More than two third of projects adopted an integrative approach, supporting adaptation responses across multiple sectors (e.g., increased water supply and sustainable agriculture).

While decreasing the risk of climate change impacts on farming was the main objective of most activities described by practitioners, the consequent increases in food security and income were highlighted as strengthening generic adaptive capacity. We identified two main approaches for adapting farming practices to climate change, with some intersections between them (Table 1). For the first, practitioners used the language of climate-smart agriculture or conservation agriculture, emphasising technical skills training and adoption of agronomic technologies often for newly introduced varieties and crops. Here, specific adaptive capacity was seen to be aided mainly by promoting more resilient crops and cropping systems. The second approach centred around agroecology, with the narrative being about re-vitalising traditional practices, using local inputs, promoting traditional crops and varieties, bringing trees into farming, building on farmers' knowledge,

enhancing ecosystem services, and supporting organic production. Landscape-oriented projects (6) and projects implemented by locally embedded NGOs (21) tended to promote this approach, providing strong evidence for how generic adaptive capacity can be developed alongside specific adaptive capacity, while also attending to the various equity dimensions. For example, agroecology was viewed as a vehicle for promoting greater self-reliance and agency amongst farmers, through reducing dependence on external providers for inputs such as seeds, pesticides and fertilisers. Similarly, the savings resulting from the use of low-cost agroecological practices (e.g., organic pest management and fertilizers, tree planting, row planting, mulching) helped to build assets and reduce poverty ([Table 1](#)). In addition, this farming approach boosts the capacity of the local environment to provide ecosystem services and cope with changing weather patterns, while the use of indigenous and local practices promotes equity through improved inclusion of resource-poor farmers who tend to rely on traditional low input/cost approaches to farming.

“They were already doing it in a very small way, but without any support to maintain their work. So, we wanted to build on existing adaptation measures, because adaptation happens locally, it’s contextually based. There’s no one scale adaptation measure for all communities. We wanted things that could really be very sustainable and wanted to build on existing adaptation measures that the people voluntarily and willing were able to do and not just introduce to them any new adaptation measure that cannot be sustainable” (06G).

Technical training and demonstrations in new or revitalised farming practices were key components of all projects, helping to build various capabilities. Training and knowledge sharing took various forms, e.g., through demonstration farms/plots, ‘learning by doing’ on own farms, introducing step by step changes in fields, social learning groups, phone apps, manuals and videos. Innovations such as radio talk shows, television dramas, farmer exchanges/farm visits, and information videos and apps, particularly were said to enhance reach and inclusivity, promoting greater equity.

Activities promoting agro-processing, value addition and marketing. In addition to supporting new or modified farming practices that reduce climate impacts, 19 practitioners mentioned that their projects included activities aimed at developing the value chains and markets of selected crops, livestock and/or natural products. A key activity was local value addition through agro-processing (e.g., shea butter, honey, briquettes), with the intention of enhancing efficiency and income generation for farmers and harvesters. Promoting organic production was also highlighted as a route to developing niche market opportunities. For livestock production, practitioners emphasised the importance of genetic herd management and introducing new breeds for growing herd size, improving animal health, and creating new market opportunities. Most rangeland projects also introduced new or revitalised traditional practices to improve rangeland condition (e.g., dry season grazing areas, cattle movement), with some supporting infrastructure like mobile kraals (pens) and drinking pans. Practitioners highlighted that a focus on value addition and marketing was crucial for building generic adaptive capacity, as better markets, local value addition and new opportunities provide a means to increase farmers’ income and their ability to invest in family health, education, physical assets, and savings.

“So, all the various enterprises I have spoken about, we really focus on value chain development from improved production to transportation, marketing and sales. Sometimes, the approach is also to connect them with private companies who are more into produce buying. So, for shea for example, which is mostly targeting women, we have a partnership with Company X. It is a shea produce buying company and when women collect the nuts and they process them, the company comes to buy. The company was very happy about the engagement with the women and all of that, so they further engaged the women to certify the landscapes the women have been collecting the organic shea from” (09G).

To enable engagement of a diversity of groups in value chains, practitioners deemed training in business management, marketing, and fund management as essential. This type of capacity building was said to help build human capital (business and financial skills) and agency, thus supporting generic adaptive capacity. Another strategy mentioned to support

marketing and enhanced income was through the formation of cooperatives, associations, and producer groups that support social relationships. Cooperatives build social capital, community cohesion, and collective agency, all essential for coping with climate change. Additionally, as a collective, cooperative members can practise their learned business skills, including price negotiation and bulking.

“There were women who usually sell honey along the roads, and we decided in this project we need to target these women so that instead of them going to the roads, they can just bring in their honey as a group or we purchase the honey at a competitive price which releases them to do other things rather than staying along the roads. We did this, and at the end of the project we managed to establish a honey bulking site” (16K).

Activities at a landscape scale. Landscape projects combine agroecology with natural resource management, restoration and commercialisation of wild products and ecosystem services like carbon sequestration. They are particularly effective in building both specific and generic adaptive capacity. Six landscape projects and five projects with a rangeland/livestock production focus had a restoration component, with several of them building on local knowledge and practices. Examples included restoring areas of rangeland with grass seedlings grown in seed banks managed by women (see [S1 Text](#)), wetland rehabilitation, tree planting on and off farms, grazing management (e.g., Allan Savory approach), and clearing invasive plants in catchment areas. In some instances, the restoration activities qualified for payments for ecosystem services helping to diversify income sources.

Landscape projects also support the sustainable harvesting of a range of natural products (e.g., shea butter, honey), which, in turn, was said to incentivise a more holistic landscape management approach amongst communities. Practitioners argued that projects promoting healthy landscapes foster specific and generic adaptive capacity by supporting livelihood diversification into more climate-resilient activities beyond agriculture. Furthermore, these projects help promote equity as activities, such as natural resource commercialisation and small business development, tended to build on women’s traditional work or were designed to specifically target the youth. Indeed, it became noticeable in the analysis that projects operating at the landscape scale made more reference to people’s livelihoods, especially the opportunity for ‘additional’ or ‘alternative’ livelihood activities, than those focused on agriculture alone, where the language was more about farming technologies, skills, and agricultural value chains.

Activities related to infrastructure development. Nearly all projects had some form of infrastructure development, especially those addressing water security (such as boreholes, dams, solar pumps, livestock watering points (dugouts)). However, infrastructure provision was always closely interwoven with other activities including capacity building around water conservation and new livelihood activities such as vegetable gardening and fish farming, thus supporting both generic and specific adaptive capacity.

Five of the agriculture and landscape projects have established local processing centres for value addition for enhanced income, and one project has constructed seed and pasture stores to reduce risk during extreme climate events.

“We provided vulnerable women with shea butter processing facilities to move away from the drudgery of indigenous processing methods” (07G).

Another project emphasised how the building of two bridges improved people’s access to health and education services and markets, especially during the wet season.

Activities enhancing access to finance and savings. Activities to improve financial capital were an explicit feature of nine projects. The establishment of savings/lending groups at the community level helps to build generic adaptive capacity, especially for women who tend to be the main participants in these groups. Benefits include better financial security, capital to invest in small-scale businesses, as well as fall-back savings or ‘insurance’ against climate change impacts.

“We mobilised women farmers and other women who wanted to join. A maximum of 30 women per group, and then we mobilised men as well. Maximum of 30 men per group. Based on their own earnings, they came up with an agreed monthly contribution. Not only were they able to save, but they were also able to access loans, like not very large loans, but smaller loans to expand their farms and their businesses as was required and some of them attested to the fact that based on their village savings associations, they were able to further their children’s education. They were able to expand their small-scale businesses, and they were able to keep their businesses running in the event of climate impacts. So aside from the fact of expansion, they were able to sustain their livelihoods and not lose them in the event of climate impact” (02G).

One practitioner shared a story of how local women had started soap production using cocoa husks, which was made possible through the saving clubs and other skills they had acquired through the project. They went on to say:

“It was a positive lesson that the economy was expanding as a result of the initial structures that we put in place” (13G).

Another practitioner mentioned how some communities were able to buy water tanks from their savings, increasing their specific adaptive capacity, while also providing for their small businesses, thus enhancing their generic adaptive capacity.

Other financial interventions included the use of digital payment systems (MTN mobile money) to save time and transport costs, and training and support to access finance from rural banks.

Activities aimed at building social relations. Enhanced social capital was a common outcome of all projects. Various ways of building relations, collective agency and social capital were mentioned by practitioners, including 1) strengthening cooperatives; 2) working with voluntary learning groups (building on the principles of social learning) and self-help groups; 3) establishing community trusts to support community-based monitoring; 4) training in conflict management; 5) development of community committees (with governing constitutions) related to specific activities (e.g., marketing committees); and 6) participatory governance training (e.g., minutes, note taking, arranging meetings, etc.). In addition, some practitioners highlighted the use of participatory scenario/adaptation planning and advocacy skills as valuable for identifying needs and escalating them to higher-level decision-makers such as local government.

Such collaborative community-oriented activities not only build generic adaptive capacity but are also important for procedural equity and are foundational for the success of other more technical activities, and consequently, specific adaptive capacity. These structures can foster participatory governance (including inclusive decision-making), learning, and innovation among community members but also their ability to advocate collectively for their needs and interests. For example, one participant mentioned how targeted activities to rebuild social capital were essential to supporting rangeland regeneration, which depended on collective action. Another spoke about how a community was able to collectively refuse an intervention that would compromise the organic nature of their landscape.

While all projects supported institution building at a community level, just over a third of practitioners mentioned how they worked with other stakeholders (e.g., local CBOs, government agencies, private sector) to forge partnerships and harness their experience and resources.

“So, the program tries to align what is in the plan by connecting the landscape challenges with private sector interest and also public sector interest and develop business cases to help address those challenges. So basically, we have an overall goal to bring public sector and private sector actors to transition from extractive destructive investment to enterprises and businesses that restore and enhance natural climate solutions and build resilience within the landscape. So that’s the overall goal of the program” (09G).

Practitioners also pointed out that it is necessary to build the capacity of sub-national government to respond to local climate change needs. Targeted activities such as climate change awareness raising and assistance with vulnerability assessments and bottom-up action plans seemed to create buy-in and skills for enabling and mainstreaming adaptation. One practitioner argued that by building the capacity of district assemblies, it was possible to reach communities beyond the project with new knowledge and skills. Examples of specific effort to connect communities with the government through, for example, community dialogues, were mentioned to help align government plans with community needs.

Other activities concerned with non-climate related vulnerability. Recognising the links between adaptation and development and being cognisant of responding to community needs, a small number of practitioners found ways to support more development-oriented activities. For instance, working with community development partners, “layering on” other projects, or considering new proposal development, were mentioned as ways to address some of the non-climate related livelihood and development needs that emerge during projects. This was particularly a strategy of locally based NGOs (13 projects) concerned with building long-term relations and resilience in the communities with whom they work. Members of these NGOs mentioned that they felt compelled to set up social service programmes for vulnerable groups, especially during and after the COVID pandemic which had such huge impacts on communities. Other activities that were directed at human health and wellbeing included nutrition programmes, training and awareness raising on cultural values of some foods, and involvement of young people in research, monitoring, and citizen science especially related to water quality (e.g., girls assessing water quality in a community-based project and the training of ecosystems custodians in another project).

Processes that help to embed equity

In this section we discuss how equity was embedded in projects, treating each dimension of equity separately, but illustrating the linkages between them (see [S3 Table](#) for additional quotes). Most practitioners mentioned several first steps that were seen as crucial for fostering equity. For instance, by undertaking stakeholder consultations, baseline surveys, mapping of community assets alongside current and past knowledge and skills, or vulnerability assessments practitioners were able to gain critical contextual information on current livelihood activities, coping mechanisms, cultural norms and practices, governance structures and power dynamics. Such information also allowed them to identify the adaptation needs of different community groups. Without this knowledge, it would be difficult to know what is needed to address multi-dimensional equity. Additionally, practitioners highlighted how the inclusion of locally based organisations and development experts with established relationships with local communities and specific groups is vital for engendering participation and cultural sensitivity. The involvement of these actors can help scaffold procedural as well as recognitional equity and assist in identification of vulnerable and marginalised community members. Similarly, having high ranking project team members, like the project manager, residing in the community was seen as highly beneficial for equity, as they could negotiate participation and inclusion daily, preventing elite takeover.

Recognitional equity: prioritising local ways of being and doing. All practitioners commented on the need for projects to recognise and build on local practices. Statements such as “we had to first understand what local farmers already know and then be able to highlight what the existing gaps are that need to be filled”; “we adopted a two way learning approach”; “the project used a bottom up approach”; “it’s about recognising what is happening at the local level and not coming and imposing external views, projects, or perspectives”; and “we look at what kind of strategies they do” were scattered throughout the interviews. One practitioner stressed the need to recognise that people in Africa have survived for millennia in very harsh environments, and this should be the starting point for any project. He further emphasised that local peoples’ inherent capability is reflected in how they live and in what they do. Overlooking current and past ways of being and doing may result in the introduction of activities that become ineffective since they fail to link up with how people carry out their daily lives. Often all that is needed are small changes to current practices.

“.....what we had to do is to build on what they are already doing, introducing them to what techniques they can use to improve those existing practices. we must first let them understand the productivity implications of the different practices and then they themselves decide which one would be relevant to their situation” (03G).

Mention was made of how farmers historically – before market-driven agricultural modernisation that came with colonisation – were practising several of the technologies advocated in agroecology and that this approach is fundamentally about revitalising former farming practices, such as mixed cropping, traditional small grains, and seed banking. In one example, a project focusing on rangeland management supported the community to rejuvenate the traditional practice of “*oliopollos*” (putting aside of land for the dry season) as a major strategy for coping with drought. Another respondent pointed out that use of the ‘Holistic Livestock Management’ methodology is essentially about taking rangeland management back to how it was done prior to European colonisation. Reversing ill-equipped ‘modernisation’ and returning to, or building on, traditions that can work in a changing climate was seen as an important part of adaptation and resilience building.

“We just knew that we’re not trying to reinvent the wheel, we’re just trying to take people back to what they knew generations back”. It is about “sharpening what people already do” and “giving voice to what people did previously” (26S).

The need to recognise local culture and Indigenous knowledge was also well integrated into most projects, sometimes with external assistance. For example, one practitioner mentioned how they drew on community-based organisations and local development specialists to assist them in understanding and responding appropriately to the local cultural context. Understanding cultural dynamics and modifying activities accordingly was highlighted as critical for successful project implementation. One practitioner spoke about how they had to adapt their plan to support women with small ruminant farming to fit the local cultural setting.

“For instance, we wanted to do small ruminants with women as an alternative livelihood for the dry season. We were told that women are not supposed to own animals in that community. We discussed with the Chiefs the best way to handle this since they still needed an alternative livelihood even though tradition was barring such an intervention. The suggestion was that they be in associations or groups. In that case the animals will be for the group and not individuals” (13G).

In terms of Indigenous and local knowledge several examples were provided on how this was incorporated in projects, with one provided below.

“We do not come with ideas from Accra and thinking that we’re just going to dump it on the people, we relied on existing local knowledge for all the interventions that we were doing” (06G).

Linking local experiential knowledge of change (often generated by the elderly) with scientific data was highlighted as a powerful way to raise awareness of climate and other environmental change and its impacts, and promote changes in behaviour and practices. Local people can provide historical data on crop planting and harvesting times and indicate changes in land cover, evapotranspiration, extreme events, flow of rivers, and water scarcity amongst others, as well as highlight the consequent impacts on livelihoods such as reduced crop productivity and increased migration. The understanding of local climate also extended to identifying and working with local indicators of weather patterns. Practitioners recognised that they had to combine scientific and local knowledge systems when considering early warning systems or weather forecasting for this to be used by communities.

“...there was huge learning, because once we got down to the communities to work with them, we realised that they had their own beliefs, they had their own systems by which they could determine whether this year there was going to be a drought or flooding or there was going to be good weather for their farming and all that....we couldn't just use scientific methods and not marry these with the local knowledge” (14G).

Indigenous knowledge was also seen as critical in supporting local natural resource-based activities such as beekeeping. One practitioner mentioned how they collaborated with local beekeeping experts to train youth to engage in this activity. Both practitioners and youth benefited from the extensive knowledge shared, including which indigenous trees attract bees, techniques for calming bees, and optimal beekeeping environments.

Recognising the value of integrating Indigenous knowledge in local actions, a project in Ghana trained district staff to engage communities in watershed planning.

“Communities would propose what they know from their Indigenous knowledge that could be used to address the challenges and then the technocrats will also propose or recommend what additional interventions could be done” (08G).

However, it was also noted that challenging traditional norms and the status quo is sometimes necessary to “change the narrative”, particularly regarding gender dynamics and women’s empowerment. One participant mentioned how this could be done.

“We would work with very respected persons in the community who could serve as a role model and champions to change the narrative” (06G).

Another practitioner highlighted the difficulty of balancing local customary practices, values, and traditions with global development agendas, particularly regarding gender equity.

“...overall, it was challenging to determine when to dispute some cultural norms and when to respect them, even when they enable and promote the exclusion of under-represented groups, such as women and youth....questioning the participants socio-cultural norms in order to promote equal rights from an external practitioner’s perspective does look a lot like not respecting their identity and traditional rights” (36S).

Similarly, while many examples of the incorporation of local knowledge are encouraging, one participant felt that the inclusion of beliefs and superstitions in climate change attribution was not helpful. They tried to increase awareness that changes in climate are a human and not spiritually induced phenomenon. These examples highlight that there are often trade-offs between recognitional and distributional equity that need careful navigation.

Procedural equity: processes for inclusion and transparency. Regarding procedural equity, all projects facilitated some form of multi-stakeholder and community level interaction to promote inclusive, transparent and sustainable project planning and implementation. Practitioners from large multilateral funded projects (15 projects), especially, emphasised the importance of engaging government at various subnational levels (e.g., district/county) from the start. This helped mainstream local adaptation needs and activities into local government plans and ensure that communities continue to receive support from district and county structures. However, a couple of practitioners noted that in contexts where local government is dysfunctional, involving this sector had little benefit for communities. Engaging other stakeholders (e.g., church leaders, private sector) was said to also be beneficial to promote project awareness, ensure wide communication, enhance opportunities, share learnings, and mobilise participation through these stakeholders’ ability to encourage community involvement in the project.

At the community level, each project had specific, yet often similar, processes and structures for engaging with and including local community members in projects. Our analysis identified four approaches: 1) formation of new committees and subcommittees at community and higher levels; 2) working with traditional authorities and/or other existing community structures; 3) formation of voluntary informal learning groups; and lastly 4) working with liaison persons. Responsibilities of these structures included the governance of decision-making around project activities, mobilising participation of community groups, monitoring and evaluation of progress, communication with project teams, conflict resolution and awareness raising.

“Community Resource Management Committees are constantly in touch with various leaders to ensure that the planned activities are all progressing and then also when we visit from time to time, we are also able to get on the ground information on progress and where we need to bring in support” (04G).

Two practitioners felt that expecting committee members to work without remuneration was unfair, given their significant role. Such payments were not common practice although one practitioner mentioned a community fund that was used to pay people who did work for wider community benefit. Others felt volunteerism was the only way to go. Capacity building (leadership development, committee organisation, record keeping) and awareness raising (climate change, gender) were considered essential for the effective functioning of local structures. Sensitisation in relation to gender and other inequities was deemed crucial for equity and justice to be achieved since local structures oversee project implementation and need to be aware of potential inequities (see procedural equity).

“Traditionally in the North, women do not or have very little space in decision making. It is always left to the men. So, we have through several engagements been able to work with the various communities to help them understand the need to give opportunity for women taking into consideration the roles and capacity women can bring to any development intervention” (08G).

New committees were typically formed in a cascading manner from regional to village levels, often aligning with existing institutional frameworks. Some members, like village leaders, participated at various levels. In Ghana, community-level ‘climate change implementation committees’ were part of the country’s adaptation programme, with district assemblies overseeing project activities undertaken by communities in their respective districts. These committees included assembly men and women, chiefs and elders, opinion leaders, young males, young females, and institutional representation. In another example from Ghana, ‘community resource management committees’ were mentioned as the main governing body for landscape projects, with devolved authority from the government to manage natural resources. These committees are required to represent various community interest groups, such as religious groups, traditional authorities, teachers, people with disabilities and farmers. One participant cautioned that:

” You are going to have the committee select a few people who are going to be very capable, very interested and very self-motivated. But make sure that you respect the traditional authority system, we ensure that the chief is represented or is serving as a patron. At the same time try and ensure that within the leadership of the committees that are set up, there’s significant participation of women” (09G).

In other projects, the village traditional leadership took direct responsibility for the project, engaging community members and project practitioners through traditional community forums. In a few instances where no structures or only unpopular ones existed people were encouraged to self-organise into voluntary groups that were shown to grow over time.

Subcommittees related to specific project activities (e.g., beekeeping, farming, lending clubs) were also common. These subcommittees were either newly established by the community committee overseeing the bigger project or formed part of existing associations/cooperatives. These structures typically managed their own organisation and leadership.

“Subcommittee members themselves choose for themselves a leader, and it is through this leader, the regular engagement from our office is done” (04G).

In other projects, regular communication between practitioners and the community was facilitated by specifically appointing liaison people.

“Usually, there’s one or two people within every community that we rely on and we call them the focal persons. So, these people act as the liaisons between us and the community members and because they are also community members, they are able to mobilise farmers and participants for us” (02G).

Across the interviews, ways in which governance structures and community committees were able to include and support less powerful groups were described. In some cases, subcommittees, like shea butter associations or environmental clubs, were led by women or youth respectively by default. Practitioners highlighted several practical steps to make committees and meetings more inclusive. The most common was the timing of meetings, ensuring they fit with community members’ daily and seasonal commitments, especially for women. The choice of venue also mattered. For example, if the venue was the Chief’s Palace, then it was said that women would not come as it is taboo. In this case, it is useful to choose places where women would be, such as marketplaces. Meetings held outside the community posed challenges too, particularly for women, making transport or cost coverage crucial for participation. In some contexts, the necessity of having separate meetings or committees for men and women (e.g., in Muslim communities) was highlighted by practitioners to allow women to express themselves freely. However, it was also argued that bringing men and women together can be crucial for understanding different perspectives and needs, transforming societal narratives, and making decisions that impact everyone. The latter can be fostered using traditional community structures such as *bazaras*, *indabas* or *durbars* where the whole community is invited.

Various methodologies and tools were used across projects to facilitate engagement (Table 2). For instance, the CRIDA (Climate Risk Informed Decision Analysis) methodology and the Regenerative Development and Design Framework were

Table 2. Methodologies, processes and tools identified that facilitate engagement and inclusion.

Approaches identified that support engagement and inclusion
Use of traditional ‘open’ community structures such as <i>bazaras</i> , <i>indabas</i> or <i>durbars</i>
CRIDA (Climate Risk Informed Decision Analysis (https://unesdoc.unesco.org/ark:/48223/pf0000265895) methodology
Regenerative Development and Design Framework (https://regenesisgroup.com/book)
Democratic voting systems (e.g., using voting stickers)
Co-creation in multi-stakeholder workshops using facilitated dialogue
Participatory mapping tools (e.g., resource allocation maps)
Scenario development
Visioning exercises
Storytelling
Video creation and other arts-based methods
Exploration of project concepts and language to reach a common understanding
Participatory learning approaches (PLA)
https://doi.org/10.1371/journal.pclm.0000697.t002

highlighted by two practitioners as effective in levelling the playing field and giving everyone a voice. Other approaches ranged from participatory learning (PLA) exercises to visioning, dialogues and arts-based methods. All are designed to actively incorporate local knowledge, perspectives and meanings. Voting systems were often used especially where decisions had to be made regarding which activities to adopt and where to implement these. Most practitioners indicated that they had employed several of these approaches together or over the duration of the project for awareness raising, informed decision making and regular communication.

“And so, a mix of community level engagement, a mix workshops, a mix of durbars, committees and one on one engagement of the community were utilised” (04G).

The following quote sums up well the sentiment of most practitioners regarding procedural equity.

“So, it is a lot about the development of capacity or enhancement of capacity and social agency for people to make informed decisions and improve their situation. So, it is about them and how they do it and how we support them to do it, so participation is very central” (33S).

Distributional equity: who is included and who benefits. The identity of the project beneficiaries depended largely on the requirements of the project funders and the type of project. Because projects were rural and natural resource related, small-scale farmers tended to be an important beneficiary group. All practitioners pointed out the need to be cognisant of gender and to ensure a minimum number of women amongst those benefiting directly from the project. Some practitioners explicitly mentioned that they were working with both men and women, with the aim of enhancing gender equity through inclusivity. Fewer participants specifically mentioned targeting the youth, and only a couple of projects aimed to support disabled members of the community.

“Youth engagement was one of the criteria because the climate vulnerability and impact studies within these communities highlighted migration of the youth to the South because of lack of economic activities. In addressing farm productivity, they realised they could do three times more production than what their fathers were doing and that encouraged a lot of the youth to be part of the project” (06G).

There was little mention of other marginalised or vulnerable groups like the elderly or ethnic minorities. Only one participant explained how the intersection of different factors, for example, levels of education, number of children, and amount of household assets, could result in differential vulnerabilities, while another described how they got agreement from the community to include nomadic pastoralists in the project because of shared land use. In an interesting example from South Africa, where government grants in the form of child grants and pensions exist, the participant spoke about working with the “missing middle”, who are people between 45–60 who are too young for pensions and their children too old for child grants.

Each project had its own process for selecting participants. Some started with a local baseline survey or vulnerability assessment to identify vulnerable households and determine how they could be supported. Focus groups were also used to understand how climate change impacted on different social groups and to understand contextual vulnerability. For example, asking the question “whose role is it to fetch water” underscored how women are impacted by water scarcity and why they need to be involved in climate change adaptation decision-making. These processes helped projects to specifically consider people who were 1) disadvantaged in terms of capacity; 2) who had little access and control over land; 3) who were asset-poor and/or food insecure; and 4) who were struggling economically. An interesting approach used by one project was to create a typology of farmers that could help in identifying types and scales of farming interventions that were more fitting to different types of farmers’ current livelihoods and cultural contexts (rather than a one size fits all approach).

For identification of individuals to participate in projects, practitioners mentioned consulting local, often traditional, authorities for participant selection (e.g., to select vulnerable households). When local leadership was involved, they employed their own methods of selection, including random draws, spatial/geographic considerations, or proximity to project sites. Another route was to work with members of existing groups within the communities (e.g., women's groups, associations of farmer/producers) as a basis for establishing new representative groups/committees that focus on adaptation. Some projects had specific requirements such as participants had to be actively engaged in certain activities and taking "some measures", such as farming gardens, to be considered. One practitioner mentioned how the project developed a beneficiary selection plan in consultation with the community through a series of workshops – so the final selection of project participants was collectively decided by the community. In a few cases, local community members could volunteer to participate if they showed interest or formed groups organically. An example was shared where a group of neighbourhood women self-organised to work on nearby communal plots for rangeland restoration. Only a couple of practitioners mentioned that they had upfront criteria to follow that were provided by their funders.

In cases where project activities such as beekeeping, grass cutter farming and livestock keeping were primarily male-dominated, projects would seek out alternative (or additional) activities that would be accessible and acceptable to women and more fitting of their contexts; *"we need to look at technologies that suit them [women]"* (22K). Similarly, activities that involved hard physical labour such as building bull camps, water retention dams and restoring water holes were best suited to men. In other cases, projects would encourage men and women to work together to break down gender stereotyping of particular livelihood activities (e.g., harvesting of shea nuts). Here the contribution to household adaptive capacity was highlighted.

In terms of reaching out to indirect beneficiaries, all the projects had ways to extend the learning and benefits from project activities beyond the direct beneficiaries. These are described in the adaptive capacity section under training activities. Some practitioners alluded that infrastructure projects such as dams and boreholes could benefit large numbers of people including neighbouring communities and others spoke about wider impacts through supporting cooperatives and improving value chains. For example, a new organic cassava value chain supported both those growing and processing cassava and the creation of a grinding mill for shea nuts was used by others in the community to grind their maize and millet. Another participant spoke about how engaging youth in green entrepreneurship projects could support other livelihood activities and needs in communities. They gave the example of using local aquaculture to provide fingerlings to fish farmers, saving these farmers travel time and costs.

As mentioned, several practitioners spoke about the importance of 'sensitising the community' and/or the community leadership to inequities (also see section on procedural equity). For example, gender sensitisation is critical to gain support for women's empowerment, especially in highly patriarchal contexts such as the Northern region of Kenya.

"So, we had to really emphasise that it's high time for the men to release their women to work so that they can earn a living out of it, so that even when there is a challenge of money through beekeeping they will be in a position to earn more money and they, their family or their family at large will not maybe suffer anymore" (16K).

One practitioner mentioned encouraging heads of households to create space for their sons and daughters to get involved in project activities. He mentioned that: *"by doing so, we were able to have a fair representation of the youth, women and the men in our groups"* (11G). Another spoke of gender dialogues between men and women to discuss how both genders make significant contributions to building household resilience, while another mentioned *"deliberately reaching out to the very marginalised like the disabled and Indigenous groups"* (18K). Several projects expanded this sensitisation to higher levels of decision-making to assist sub-national government mainstream gender and climate change into their medium-term development plans and budgets (see procedural equity).

In addition to sensitisation, practitioners reported several examples of where projects were adapted to improve equity outcomes where this was lacking. In some instances, practitioners went back to the drawing board to develop new livelihood options more suited to women's roles or built on activities women were already engaged in. There were also examples of projects changing their selection criteria for specific project activities. For example, a practitioner from a project in South Africa mentioned how they adjusted their basic requirements for one of their training sessions to make it fairer.

"The New Venture training eliminated many people who did not have Grade 10 English, so this eliminated some people from the project initially. Mechanisms were developed to later accommodate everyone and find ways to capacitate them no matter their educational level" (27S).

In another example, the project team realised that their initial call for proposals for locally driven 'on-the-ground' projects would not necessarily result in resources flowing to the most vulnerable areas and communities, but rather to grantees that could write well and have good experience in implementing projects. For this reason, they decided to scrap the call for proposals and rather use the risk and vulnerability assessments they had done during COVID to identify where and who is most vulnerable and then work with multiple stakeholders in these areas to select suitable activities.

Discussion

On the framing

We found that our composite framework, which brings together the lenses of adaptive capacity and equity, was helpful for understanding how projects integrate (whether purposely or indirectly) aspects of human development with adaptation to climate change through a focus on project activities and processes respectively.

Our results illustrate that both types of adaptive capacity and the three dimensions of equity are closely intertwined, interdependent and sometimes conflictual (also see Wells *et al.* [32]), while all are important for equitable adaptation. We found that even the most well-intentioned efforts at building the adaptive capacity of vulnerable and marginalised groups are unlikely to succeed without specific attention to the influence of local norms and practices and the deliberative inclusion of such groups in project design and implementation processes. For instance, we were able to gain a nuanced perspective of whether projects were going beyond 'retrofitting' to effecting more transformative change, by observing where generic adaptive capacity was developed primarily through careful consideration of underlying equity concerns such as uneven land ownership, poor access to credit and a lack of voice and decision-making power [5].

Consequently, it can be argued that recognitional and procedural equity underlie who ultimately benefits from projects (distributional equity) and whether their adaptive capacity is enhanced [5,7,33].

However, that said, our results also revealed there are complex trade-offs between the three equity dimensions. For example, the constraints and discriminations vulnerable and marginalised groups face are often a consequence of traditional institutions and social norms, which can result in tensions between procedural and recognitional equity (for example between gender norms and the inclusion of women in decision-making processes related to the project). Judicious approaches are required to navigate through these tensions [32,33] and to avoid the sense of imposing 'outsider' norms (mentioned by some practitioners). We found several examples where some such tensions were negotiated by including respected community members in gender sensitisation and awareness building. Other processes such as separate meetings/committees, explicit discussions, storytelling around women's roles, and encouraging men and women to work together by demonstrating the benefits to the household were also mentioned.

Uncovering the complex relationships between the different aspects of equitable adaptation requires conscious awareness of such issues through regular reflection on the project. This can be done using the multidimensional equity typology as a guide. Furthermore, paying careful attention to processes of engagement, including who can voice their needs, values, knowledge and concerns is essential to promote equity and justice [11]. Interestingly, the application of

the multidimensional typology of equity also highlights that the distinction in the literature between planned and autonomous adaptation is not always helpful. Our analysis shows that projects that build on what communities are already doing are more likely to achieve equitable and climate resilient outcomes. It is crucial to recognise how people are already conducting their lives and what their priorities are if adaptation is going to be embraced locally and improve livelihoods. Furthermore, understanding the constraints and discriminations marginalised and vulnerable groups face is important to target them specifically. These constraints can include pre-existing political, economic, structural, cultural and social conditions [34].

Enhancing livelihoods, adaptive capacity, and equity

Only a third of projects were designed specifically with a view to building livelihood assets, capabilities and generic adaptive capacity alongside specific adaptive capacity. However, as illustrated in our results many activities that were considered primarily as responses to climate change had outcomes that helped reduce poverty, inequality, and inequity and develop learning, social relations and agency [22]. But this was not always enough to have the type of impact needed to reverse longstanding and deeply entrenched social differences [5]. Projects that specifically included activities that contributed directly to building financial capital, especially for women, and that supported changing social relations via advocacy and training were better able to make a difference for marginalised groups. The most inspiring stories of equity and collective agency shared by practitioners came from those projects that supported access to credit, created savings clubs, provided basic financial training, and facilitated new income opportunities while building inclusive and collaborative governance systems and responding to local priorities. The value of micro-credit and improved access to finance for supporting livelihoods is well recognised [35], but still often neglected in adaptation responses, as we observed. We also found that projects taking a wider landscape approach to enhance natural capital through both improved natural resource governance and the development of opportunities linked to wild natural products, agroforestry, and agroecology tended to illustrate more evidence of enhanced generic adaptive capacity and equity across all three dimensions. The incorporation of local knowledge and practices were particularly strong in such projects, many of which related to the harvesting of wild products. Greater impacts can also be achieved in projects where the implementers had good vertical social capital and could influence higher level policy and decision making. Incorporation of these different aspects can make a substantive difference to the livelihoods of more marginalised groups such as women and youth [36].

Another important finding is that NGOs (working with other partners) that have been embedded in a particular landscape or context for a long time seemed the most able to work through issues of gender and other inequities, uneven power relations, and cultural concerns and so support more equitable adaptation. This is probably because of the levels of trust that these organisations have established with communities over the years and their deep and nuanced understanding of multiple aspects of the local context. Such NGOs are better able to work closely with communities to address the wide range of development concerns and challenges that local people are experiencing alongside climate change. Cockburn et al. [37] provide a similar argument in the context of landscape stewardship. Such local responsibility for adaptation is one of the basic tenets of the currently widely endorsed 'local-level adaptation' approach [38]. The type of organisation involved in the implementation of projects, and the partnerships they have, can thus influence the realisation of equitable and fair outcomes [37]. Local organisations can be even more effective when they have a certain level of influence on higher-level decision-making, making it more possible to change the circumstances that lead to deep-rooted vulnerabilities.

However, it is also important to note that whatever is possible is always limited by what funding is available and how it is structured. Often, there is inadequate funding to do the essential baseline analysis, leading to piecemeal work that inhibits the development of the trusting social relations that are so vital. Furthermore, addressing non-climate related concerns, however important they are for responding to climate change, are often not funded by climate change funders. This is where linking with development partners or raising further funding to tackle the basic human development related

issues that arise in adaptation projects was mentioned by practitioners as a way to be more responsive to the multiple causes of vulnerability.

What is encouraging from our results is that, while the language and terminology used may vary and not every project had all the necessary elements for equitable adaptation, project practitioners are broadly aware of the need to incorporate aspects of human development into the work they do in order to reduce existing vulnerabilities and provide people with the means to adapt to the changes they are experiencing. This evolves from an awareness of the contexts they are working in. Furthermore, it is not just rhetoric. We found evidence across projects that effort has been made to facilitate inclusive implementation processes and to build livelihoods assets and capabilities as well as specific responses to climate change. This presents a more optimistic view than in some of the literature [5] and provides an important foundation and set of learnings (see Shackleton et al. [39]) that can be developed further towards more transformative adaptation. However, that said, additional research based on interviews with project beneficiaries themselves and using more direct measures of equity and adaptive capacity, perhaps against a baseline, would be invaluable to further improve our understanding.

Conclusion

Based on the findings from our research, we argue that a combination of 1) project activities designed to build both specific and generic adaptive capacity and the full range of livelihood assets and capabilities [22], and 2) inclusive, collaborative processes that pay due attention to procedural, recognitional and distributional equity are needed to enable equitable adaptation and for projects to contribute more broadly to sustainable development. The use of our framework in designing, implementing, reflecting on, and monitoring projects could help in achieving these desired outcomes. Without inclusivity and special effort to listen and respond to marginalised voices there may be no shift in the status quo and limited understanding of what might be needed (or changed) to benefit more marginalised groups (also highlighted by Pelling and Garschagen [9]). Addressing poverty, inequality, and inequity in climate change adaptation responses thus clearly “requires deliberative processes that acknowledge and respect diverse rights, needs, livelihoods, knowledge, worldviews and cultures through transparency, accountability, legitimacy and responsiveness” [14] (pg. 499). A failure to account for such social justice concerns in climate adaptation planning and implementation will limit the overall success and sustainability of climate adaptation efforts and reinforce existing vulnerabilities [13]. In contrast, adaptation projects that “prioritise equity, climate justice, rights-based approaches, social justice and inclusivity” [1] (pg. 101), can reduce the vulnerability of marginalised groups and support sustainable development. Furthermore, “meaningful participation and inclusive planning, informed by cultural values, Indigenous knowledge, local knowledge and scientific knowledge” [1] (pg. 101) can help address vulnerability, build resilience, and avoid maladaptation.

Supporting information

S1 Table. Projects selected and their characteristics.

(DOCX)

S2 Table. Codes for first (deductive) level of analysis using NVivo.

(DOCX)

S1 Text. Case study box: Story of grass seedbanks and women’s empowerment.

(DOCX)

S3 Table. Additional quotes providing further evidence for equity sections of results.

(DOCX)

S1 Checklist. Inclusivity in global research.

(DOCX)

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