Social equity and sustainability considerations in the planning of Nature-based solutions in Southern African Water Towers

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Authors declaration

I, Andrea Campbell, declare that this thesis/dissertation is based on my own original work and all contributions and quotations have been correctly cited and referenced. This thesis/dissertation has not been and will not be submitted in whole, or in part, for another degree at this or any other university.

Signature: Signed by candidate Date: 08.07.2022

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Abstract

Nature-based solutions (NbS) – ecosystem protection, restoration, sustainable management, and creation – are increasingly being promoted to support human well-being and ecosystem health, particularly in the context of a changing climate. As such, NbS are gaining popularity globally in international policy and programmes resulting in an increase in multilateral funding from the Global North for NbS projects in developing countries. However, concerns have arisen around how suitable these interventions are in local contexts where local communities are heavily reliant on natural resources given the potential for social, economic, and environmental trade-offs.

This research aimed to address these concerns by exploring: i) whether and how social equity has been considered in NbS project design, particularly in relation to vulnerable groups; and ii) whether project sustainability (in terms of longevity and more broadly in terms of sustainable development) has been linked to social equity. The research focused on Southern African NbS projects that are of relevance to areas important to water supply (known as Water Towers). This excluded all marine, coastal, and urban NbS types. Firstly, a systematic mapping was undertaken of relevant multilateral funded project documents (number of projects=134) for the region. Secondly an in-depth qualitative analysis of project planning documents for a random subset (n_p=16) of these latter NbS projects was conducted using a multidimensional equity framework, including distributional, procedural, and recognitional dimensions of equity.

Research findings show that NbS projects in Southern Africa tend to incorporate multiple NbS types into individual country projects targeting cross-cutting societal challenges including climate change adaptation, food security, sustainable livelihoods, and conservation among others. While distributional and procedural equity aspects were mentioned in the project documents, there was a lack of clear details showing how these equity considerations would be supported and realised in project implementation. Recognitional equity, despite being mentioned with a focus on details of the inclusion of traditional and indigenous knowledge was generally excluded from NbS project design. While gender was regularly broadly considered, there was limited evidence of attempts to differentiate vulnerable groups within local communities.

Project sustainability was somewhat linked to social equity in project design through regular mention of capacity building and participation in the project documentation, but large gaps existed, particularly in relation to the processes of local-level participation. Furthermore, projects did not fully recognise the complexity inherent in working towards multiple, at times conflicting, goals related to sustainable development when considering achieving equity in local contexts, e.g., where local natural resource management and agricultural practices were at odds with the project related NbS objectives. This is an example of a type of constraint to achieving social equity in NbS that should be considered and addressed during NbS design and planning.

This research echoes calls for equitable approaches to NbS design and planning that recognise that social equity should be both a process and an outcome of NbS to contribute towards sustainable development. For this to be achieved multidimensions of equity need to be incorporated early in the design and planning of NbS, and through to implementation.

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Figures, tables, and boxes

Acronyms

CBD	Convention on Biological Diversity
CBNRM	Community-based natural resource management
EbA	Ecosystem-based adaptation
FFS	Farmer Field School
FPIC	Free, Prior & Informed Consent
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
M&E	Monitoring and evaluation
NbS	Nature-based solutions
NDC	Nationally Determined Contribution
PMERL	Participatory Monitoring, Evaluation, Reflection & Learning
REDD	Reducing Emissions from Deforestation and Forest Degradation
SDGs	Sustainable Development Goals
TES NbS	Towards Equitable and Sustainable Nature-based Solutions
UNFCCC	United Nations Framework Convention on Climate Change

Chapter One: Introduction

1.1 Introduction and rationale

Nature-based solutions (NbS) involve working with nature to address a wide range of societal challenges (Seddon et al., 2021). Examples of NbS are diverse and include catchment restoration, agroforestry, conservation agriculture, protected areas, reforestation, and rooftop urban gardens among others (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep) (Figure 1). NbS are increasingly being adopted as approaches that can promote human well-being and environmental welfare, particularly in the context of climate change mitigation and adaptation (Chausson et al., 2020, Seddon et al., 2021). However, widespread popularisation of NbS along with the increase in multilateral funded campaigns for NbS has raised concern amongst scholars, policy makers, and practitioners in the Global South regarding social equity outcomes and their sustainability given complex local contexts and ongoing climate change (Bond et al., 2019, Fairhead, Leach & Scoones, 2012, Fleischman et al., 2020, OneEarth, 2020).

Concerns from the Global South include the lack of consideration of who benefits or disbenefits from NbS projects with a focus on the most vulnerable groups or individuals, and whether equitable participation in NbS design, planning, and implementation is realised or appreciated (Bond et al., 2019, OneEarth, 2020, TESNbS, 2022). Furthermore, the importance of social equity as a process and outcome for ensuring sustainability of NbS projects both in terms of project longevity and in the context of sustainable development has been highlighted. It has been proposed that social equity outcomes are critical to support the sustainability of a project beyond its funding period, but also to contribute meaningfully to sustainable development which can be defined by the Sustainable Development Goals (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep, Leach et al., 2018). While the interlinked nature of social equity for achieving sustainability has been receiving more attention in the NbS literature (Cohen-Shacham et al., 2019, Eriksen et al., 2021, Seddon et al., 2021), the extent to which equity and sustainability and their interlinkages are incorporated into multilateral NbS-related projects has not been investigated.

1.2 Aim and objectives

In this thesis, I addressed this above gap by exploring social equity and sustainability considerations in the design and planning of multilateral NbS projects of relevance to areas

important for water supply (referred to as Water Towers (Nel et al., 2017, Viviroli et al., 2007)) in Southern Africa (i.e. excluding marine, coastal, and urban NbS types). Specifically, I investigated:
i) whether and how multiple equity dimensions (including procedural, recognitional, and distributional equity dimensions) are included in NbS design and planning; and
ii) whether NbS project design and planning makes links between social equity and project sustainability (in terms of project longevity beyond the project funding period and more broadly in terms of sustainable development as defined by the Sustainable Development Goals).

To achieve the above aim and objectives the following two methodological components were used: i) systematic mapping of country-level NbS projects of relevance to Water Towers in Southern Africa, in terms of broad NbS type, targeted societal challenge, and funder; and ii) an in-depth analysis of a representative subset of these NbS projects using a qualitative in-depth approach.

For the in-depth analysis, I used a framework for conceptualising social equity in NbS (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep) (Figure 1). This framework proposes that to achieve: i) equitable NbS to global societal challenges, NbS need to be equitable at a local level; and ii) to achieve equity at the local level, NbS need to incorporate social equity as a process in the design, planning, and implementation. This includes incorporating multiple dimensions of equity: procedural, recognitional, and distributional, and considering constraints to social equity (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep) (Figure 1).

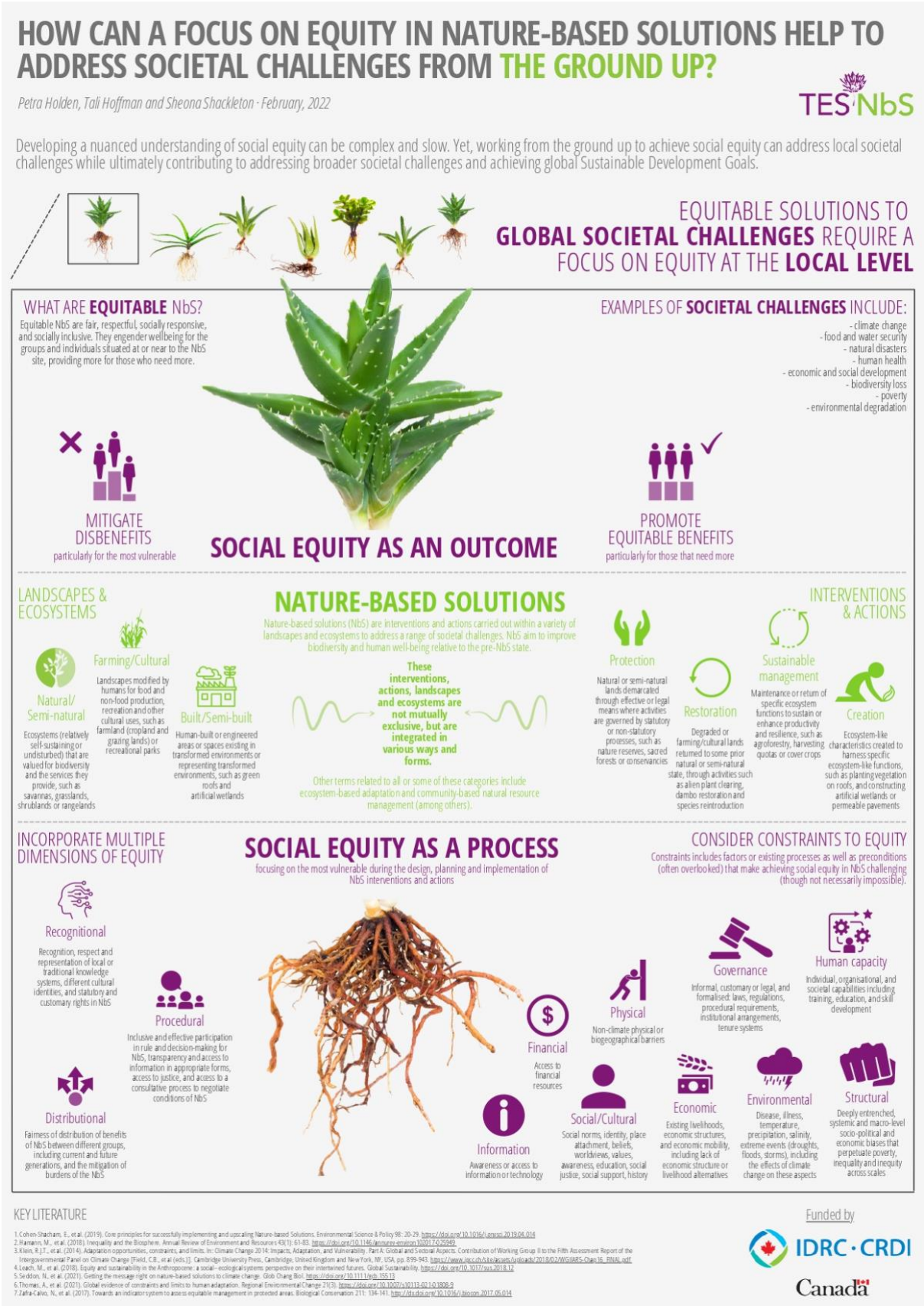

Figure 1: TES NbS framework for social equity (Holden, Hoffman & Shackleton, 2022)

1.3 Thesis outline

This thesis is structured into six chapters. This chapter (chapter one) introduced the study, detailed the aims and objectives, and provided a brief overview of the theoretical framework and concepts. Chapter two below provides more detailed information on the theoretical framing for the thesis, including the concepts of NbS, NbS funding, NbS guidelines, and NbS in Southern Africa. It also provides further framing for social equity and sustainability. Chapter three details the research methodology which includes the study region and context as well as the research methods which are disaggregated into five clear steps. Chapter four presents the research results, structured according to dataset, dimension of equity, and sustainability. Chapter five consists of the discussion where results are explored as they pertain to social equity and sustainability in NbS. Chapter six concludes the research by summarising findings and presenting key insights for planning and implementation of future NbS projects. Finally, study limitations and areas for follow-up research are presented.

Chapter Two: Theoretical and conceptual framing

2.1 Nature-based solutions

Nature-based solutions (NbS) involve the protection, restoration, and management of natural and semi-natural ecosystems; the sustainable management of working lands and aquatic systems; and the creation of novel ecosystems in and around cities or across the wider landscape (Seddon et al 2021). NbS aim to address societal challenges, including climate change, food and water security, natural disasters, human health, and/or social and economic development (Cohen et al 2016, 2019), while increasing biodiversity and human well-being relative to the pre-NbS state (Seddon et al., 2021, TESNbS, 2021).

NbS has become an 'umbrella' term for several other policy-relevant terms, such as ecosystem-based adaptation, ecosystem-based mitigation, ecological/green infrastructure interventions, ecological engineering, REDD+, ecosystem-based disaster risk reduction, and natural climate solutions amongst others (Cohen-Shacham et al., 2019, Seddon et al., 2021). These policy-relevant terms are underpinned by a wide range of actions or interventions that include ecological restoration, reforestation, rehabilitation and revegetation, biodiversity and natural resource management, protected areas, private land conservation areas, conservancies, and community-based approaches, and sustainable agricultural practices, such as conservation agriculture and agroforestry (Chausson et al., 2020, Seddon et al., 2021). While a relatively new concept, the aim of this encompassing term is to unify NbS approaches under a single framework that enables easier upscaling and implementation (Cohen-Shacham et al., 2016) and prevents the assumption that interventions are fit for only one purpose (Seddon et al., 2021).

It is expected that well-designed NbS projects should have multiple co-benefits for both biodiversity and humanity (Chausson et al., 2020), such as reducing flood risk or storing carbon, while supporting ecosystems for biodiversity (Seddon et al., 2021). Given the current strain on the earth's system in the 'Anthropocene' (Steffen et al., 2015), such solutions are particularly promising, although many of them are not necessarily new (Holden et al., in prep). The concept of NbS has grown in popularity in international policy and programmes, as global recognition of the importance of functioning ecosystems for human well-being has become increasingly apparent, particularly with regard to climate change (UNEP, 2021).

For example, NbS gained traction within the International Union for Conservation of Nature from 2009 onwards, the European Commission's research 'Horizon 2020' (Cohen-Shacham et al., 2016), the fifth United Nations Environment Assembly focus on 'Strengthening Actions for Nature to Achieve the Sustainable Development Goals,' and the recent UN Decade on Ecosystem Restoration, which was set to begin in 2021 (UNEP, 2021). Under the banner of NbS, these programmes promote the protection and restoration of the natural and semi-natural environment in an effort to safeguard ecosystem services across both urban and natural spaces.

2.2 Funding for NbS

As NbS has gained traction in policy and research, there has been an increase in funding for NbS projects through various multilateral funds, such as the Green Climate Fund, Least Developed Countries Fund, Adaptation Fund, GEF Trust Fund, Special Climate Change Fund, UN REDD Programme, and the BioCarbon Fund among others. Broadly these funds attempt to help developing countries' focus on and tackle large-scale environmental, climate, and social challenges by channelling funds, mainly donated by developed nations, to various projects and programmes. There are variations in focus across multilateral funds, with some having a strong climate change adaptation focus, such as the Adaptation Fund, and others with a focus on climate change mitigation, such as the UN REDD Programme and the BioCarbon Fund. The Green Climate Fund, Special Climate Change Fund, and Least Developed Countries Fund contribute to both climate change adaptation and mitigation, and the GEF Trust Fund has a cross-cutting focus including climate change adaptation, mitigation, and a range of other topics such as biodiversity, land degradation, and international waters (CFU, 2019a, CFU, 2019b, CFU, 2019c, CFU, 2019d, GEF, 2022).

Despite this increase in multilateral funding for NbS, funding is still insufficient for current climate change and environment-related needs (UNEP, 2021). The recent Adaptation Gap Report 2020 by the United Nations Environment Programme looks at progress in planning, financing, and implementing adaptation with a particular focus on NbS. The report assesses climate adaptation efforts globally and finds that, while there has been increased advancement in adaptation planning, there are still significant gaps in finance for developing countries and for implementing projects on the ground. The report calls for NbS to become a priority in climate change adaptation planning, and thus for increased finance and urgent

implementation (UNEP, 2021). Similarly, a recent study looking to understand climate-related finance across Africa noted that there has been an increased interest in NbS. However, climate-related funding for biodiversity was minimal, despite the identification by African nations of vulnerable ecosystems in their respective countries (Savvidou et al., 2021).

2.3 NbS guidelines for best practice

Given concerns that NbS application may be inconsistent, and to ensure NbS projects are credible and effectively tracked to better understand how success in NbS can be supported, a global standard for NbS has been developed by the International Union for the Conservation of Nature (IUCN) (Box 1). The criteria for this standard show consideration for a wide variety of social and environmental aspects of NbS policy and practice (IUCN, 2020).

Box 1: The IUCN's Global Standards for NbS

The IUCN's Global Standards for NbS present eight criteria for the verification, design, and scaling up of NbS. These are as follows: 1) NbS effectively address societal challenges, 2) Design of NbS is informed by scale, 3) NbS result in a net gain to biodiversity and ecosystem integrity, 4) NbS are economically viable, 5) NbS are based on inclusive, transparent, and empowering governance processes, 6) NbS equitably balance trade-offs between achievement of their primary goal(s) and the continued provision of multiple benefits, 7) NbS are managed adaptively, based on evidence, and 8) NbS are sustainable and mainstreamed within an appropriate jurisdictional context (IUCN, 2020).

While NbS have much to offer to achieve sustainable development if implemented according to these guidelines, recent literature has recognised that poorly designed NbS initiatives can have adverse effects on both local communities and the environment. Examples include where access to natural resources on which communities depend is cut off as a result of NbS, or if local communities are excluded from critical decision-making processes that affect their livelihoods (Seddon et al., 2021). Furthermore, a lack of understanding of context-specific social-ecological vulnerability and a lack of social equity in stakeholder participation in the design and implementation of projects can result in maladaptation (Eriksen et al., 2021).

Maladaptive outcomes, including elite capture, reinforced inequitable socio-political relations, lack of access to natural resources, environmental degradation, and increased health risks, can result in vulnerability being increased, reinforced or even newly created (Eriksen et

al., 2021). For example, where local land rights and tenure agreements are not honoured, risk of land grabs by government or the private sector increases (Seddon et al., 2020). Maladaptation can occur from poorly planned adaptation interventions but also from deliberate decisions that place a focus on short-term outcomes over long-term threats, or that ignore or overlook potential interactions that may result from the planned intervention (Noble, 2014). This includes how ecosystem service trade-offs are decided and the resulting benefits and disbenefits across different spatial (from local to global) and temporal scales.

An infamous example of maladaptation is tree-planting in grasslands and savannas. Tree-planting in treeless open ecosystems can negatively impact biodiversity, compromise the carbon sequestration potential of these open ecosystems, negatively impact surface water supply and groundwater recharge, and have an added social impact on livelihoods dependant on these habitats as grazing lands (Bond et al., 2019, Fairhead, Leach & Scoones, 2012, Fleischman et al., 2020, OneEarth, 2020).

2.4 Equity and sustainability

The growing evidence that NbS projects are not always equitable or sustainable (Eriksen et al., 2021, OneEarth, 2020) raises the question of what an equitable and sustainable NbS project looks like. Equity can be considered as a measure of 'fairness,' with the understanding that fair might not necessarily be equal (McDermott, Mahanty & Schreckenberg, 2013). It is a challenging concept to assess as people have differing ideas about what exactly is fair and just (Bennett, 2020). It is therefore difficult to establish set indicators for 'fairness.' However, progress has been made in conservation planning and management (Bennett, 2020, Zafra-Calvo et al., 2017). Building on work by McDermott, Mahanty & Schreckenberg (2013), Pascual et al. (2014), Schreckenberg et al. (2016), and Zafra-Calvo et al. (2017), Bennett et al. (2020) highlight three clear dimensions of equity that should be taken into account when designing or implementing protected areas.

These dimensions of equity are: i) *recognitional equity* which is the respect and representation of local or traditional knowledge systems, different cultural identities, and statutory and customary rights; ii) *procedural equity* which is the inclusive and effective participation in rule and decision-making, transparency and access to information in appropriate forms, access to justice, and access to a consultative process to negotiate conditions; and iii) *distributional equity* which includes the fairness of the distribution of

benefits between different groups, including current and future generations, and the mitigation of burdens (Bennett et al. 2020).

Although the word 'sustainability' has a long history which includes multiple definitions in relation to sustainable development, recently it has been defined as "*the long-term maintenance of desirable and meaningful life support systems which are biophysically, culturally and socially determined*" (Leach et al., 2018). This definition has equity at the root through the use of the words 'desirable', 'meaningful' and 'culturally' and 'socially determined'. Leach et al. (2018) argues that equity and sustainability are intertwined, and that equity is pivotal for the achievement of the Sustainable Development Goals (SDGs). The seventeen SDGs, comprising 169 targets, are an ambitious set of goals to achieve Agenda 2030, adopted in 2015 by United Nations member states as a means to ensure a prosperous future for people and the planet (UN, n.d).

Therefore, coming back to the original question posed above on what an equitable and sustainable NbS looks like, Holden et al. (2022) emphasise that only NbS equitable at the local level can be considered to contribute to addressing broader societal challenges and achieving global SDGs (Figure 1). They define an equitable NbS as being *"fair, respectful, socially responsive, socially inclusive and engendering well-being for the groups and individuals situated at or near to the NbS site, providing more for those who need more."* The main argument being that without incorporating social equity as a process in NbS design, planning, and implementation, one cannot contribute in an equitable manner to local societal challenges or global societal challenges (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep). Therefore, an understanding and incorporation of multiple equity dimensions and constraints to equity in relation to NbS design, planning, and implementation can enhance project design and support sustainability both in terms of project longevity but also in terms of contributing to sustainable development in relation to the Sustainable Development Goals (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep).

2.5 NbS in Southern Africa

As a relatively new term, there is limited literature that specifically uses the term NbS in Southern Africa (Holden et al., in prep). In most cases the term NbS has been used in relation to studies that have focused on water issues (Acreman et al., 2021, Holden et al., 2022). However, as NbS acts as an 'umbrella' term and incorporates various approaches, there are

multiple NbS interventions that have existed both globally and in Southern Africa for some time. For example, protected areas for biodiversity conservation have a long history in Southern Africa with the first official protected area being the Pongola Nature Reserve in South Africa in 1894 (Goosen & Blackmore, 2018).

The protectionist approach of 'fortress conservation' in protected areas has been wrought with social justice and (in)equity issues, particularly where local communities were forcibly removed from designated protected areas and cut off from natural resources and biodiversity management (Gandiwa et al., 2021). While progress has been made in this regard, issues around natural resource access continue to be a challenge (Eriksen et al., 2021). The issues around protected areas and social equity, including the movement to more equitable approaches to conservation actions, have been well captured in the literature (Bennett, 2020, Schreckenberg et al., 2016, Zafra-Calvo et al., 2017).

Beyond protected areas, there is a long history and broad literature on multiple NbS approaches, such as sustainable natural resource management (Barendse et al., 2016), agroforestry (Sheppard et al., 2020), sustainable forest management (Dlamini, Larwanou & Chirwa, 2015, Senganimalunje, Chirwa & Babalola, 2015), conservation agriculture (Andersson & D'Souza, 2014), and restoration (Nkambule et al., 2017) among others, across Southern Africa. Some of these interventions have been framed under other policy-relevant terminologies such as ecosystem-based adaptation (EbA) (Black, Turpie & Rao, 2016, Cartwright, 2013), REDD+ (Mackinnon et al., 2017), community-based natural resource management (CBNRM) (Dyer et al., 2014), and ecological infrastructure (Cumming et al., 2017) interventions. There are multiple studies done that explore the impacts of CBNRM on social equity (Gibbes & Keys, 2010, Hebinck, Kiaka & Lubilo, 2019). Furthermore, there is a broad body of work on assessing the socio-economic benefits of catchment and river restoration under the framing of EbA and ecological infrastructure, particularly in South Africa (Coldrey, 2020, Coldrey et al., 2022, Crookes et al., 2013, Mander et al., 2017, Mbopha et al., 2021, Rebelo et al., 2021). Refer to Table 1 for a non-exhaustive overview of some of this literature. This includes those where the term 'Nature-based solutions' has been used, which is limited in the Southern African context (Holden et al., in prep).

Table 1: A non-exhaustive list of various literature on NbS approaches in Southern Africa. NbS category and NbS intervention are based on Holden et al. 2022 and in prep.

NbS Category	**NbS Intervention**	**Brief description**	**Reference**
Protection	Protected areas	National Parks and conservancy histories in South Africa, Angola, and Zimbabwe	(Gandiwa et al., 2021, Goosen & Blackmore, 2018, Huntley et al., 2019)
Sustainable management	CBNRM	Communal Areas Management Programme for Indigenous Resources (CAMPFIRE)	(Gandiwa et al., 2021, Muzirambi, Musavengane & Mearns, 2019, Taylor, R, 2009)
		Complexity of CBNRM	(Blaikie, 2006, Hebinck, Kiaka & Lubilo, 2019)
	Agroforestry	Appropriateness in a changing climate	(Sheppard et al., 2020)
		Policy in Southern Africa	(Ndlovu & Borrass, 2021)
		Co-benefits for mitigation, adaptation, and food security	(Syampungani et al., 2010)
		Contribution to biodiversity and livelihood improvements for rural communities	(Kalaba et al., 2010)
	Conservation agriculture	CA potential as 'climate smart agriculture'	(Thierfelder et al., 2017)
Restoration	EbA	Cost effectiveness of EbA case study in South Africa	(Black, Turpie & Rao, 2016, Guerbois et al., 2019)
		Cost/benefits of EbA compared to hard engineered options	(Cartwright, 2013)
		EbA in the urban context of Durban	(Roberts et al., 2012)
		Socio-ecological approach to identifying EbA priorities	(Bourne et al., 2016)

	Restoration	Effectiveness of NbS to water issues	(Acreman et al., 2021)
		Risk analysis and economic viability of ecological restoration in South Africa	(Crookes et al., 2013)
	Invasive alien clearing	Benefits and costs of invasive alien plants clearing in KwaZulu-Natal	(Nkambule et al., 2017)
		Invasive alien tree clearing to reduce impact of anthropogenic climate change on drought streamflow	(Holden et al., 2022)
	REDD+	Implications of livelihood projects on project cost for local benefits in REDD+ and forest conservation projects	(Mackinnon et al., 2017)
NbS broadly		Collaborative governance for scaling NbS in Southern Africa	(Midgley et al., 2021)
		Special issue on investing ecological infrastructure in South Africa	(Kubiszewski, Marais & Costanza, 2017)
		Systematic literature review on ecological infrastructure investment	(Mbopha et al., 2021)
		Benefits of ecological infrastructure interventions in three South African water catchment systems	(Rebelo et al., 2021)
		Financing options for ecological infrastructure	(Coldrey, 2020)

Chapter Three: Methodology and approach

3.1 TES NbS project

This study forms part of the TES NbS (Towards Equitable and Sustainable Nature-based Solutions) project, led by the African Climate and Development Initiative and funded by the International Development Research Council (IDRC, 2021). TES NbS aims to increase awareness of the opportunities, constraints, and limits to NbS, especially as these relate to vulnerable groups in Southern Africa. Therefore, certain aspects of this study were preset or predetermined in advance, based on the broader framing and research under TES NbS. This includes the NbS and equity framework used (Holden, Hoffman & Shackleton, 2022), the study region, and the focal NbS types.

The TES NbS project focuses on: i) the Southern African region, including the following eleven Southern African countries; South Africa, Namibia, Botswana, Zimbabwe, Mozambique, Zambia, Malawi, Eswatini, Angola, Lesotho, and Madagascar; and ii) NbS types that would be in principle implemented in areas important for water supply (i.e. excluding marine, coastal, and urban NbS types) referred to as Water Towers (Nel et al., 2017, Viviroli et al., 2007). These areas are generally elevated (mountains, plateaus, and other high-lying areas) and have relatively high runoff and are, or have potential to be, critical for the supply of water to local communities and economies, as well as transboundary and national river systems (Nel et al., 2017, TESNbS, 2021, Viviroli et al., 2007, Viviroli et al., 2020).

3.2 The study region

3.2.1 Climate, vegetation, and topography

Southern Africa (Figure 2) is made up of a large peninsular flanked by ocean to the east, west, and south, with the convergence of the Agulhas and Benguela currents having notable influence on regional climate. A plateau of 1−1.5km high (peaking at 2.5−3km in Lesotho) makes up most of the interior, with a narrow coastal belt, widening substantially along the Mozambique coast (Reason, 2017). Variable topography across the region also has a significant impact on rainfall gradients, vegetation types and thus plant and animal communities. Southern Africa is categorised into seven biomes, namely: Deserts and Xeric Shrublands, Flooded Grasslands and Savannas, Mediterranean Forests, Woodland, and Scrub,

Montane Grasslands and Shrublands, Tropical and Subtropical Dry Broadleaf Forest, Tropical and Subtropical Grasslands, Savannas and Shrublands and Tropical and Subtropical Moist Broadleaf Forest (See Table 2 and Figure 3). Rainfall decreases from the east to the west coast with higher rainfall occurrence on the east coast due to warmer sea surface temperature being amplified by moist airlift along the mountainous eastern coastline. The island of Madagascar is dominated by mountains creating a rain shadow in the west and south-west of the island. The location of the island has an impact on climate on the mainland by reducing the number and extent of tropical cyclone landfall, and adding to the aridity of the Limpopo region (Reason, 2017).

Variable topography and rainfall gradients result in Afromontane coastal belt forest up the east coast of South Africa and Mozambique, and tropical rainforest in eastern Madagascar. Grassy savanna (Kwazulu-Natal, southern Zimbabwe, and southern Mozambique) and woody savanna (northeast South Africa, northern Mozambique, Zimbabwe, and Zambia) dominate inland of the east coast, with grasslands in South Africa towards the northern region of the country. Further west is characterised by aridity in the Kalahari with scrubland and sparse grass. The semi-arid Karoo of low-lying scrub exists to the south of the Kalahari and meets succulent, semi-arid fynbos to the south, and hyper-arid Namib desert from about 30°S to 16°S in southern Angola. The winter rainfall of the south-west supports the fynbos-dominated Cape Floral Kingdom, and merges with the small all-season rainfall temperate forest of the Tsitsikamma coast (Keith et al., 2020, Reason, 2017).

Table 2: Brief biome descriptions of Southern Africa

Biome	Description	Reference
Deserts and Xeric Shrubland	Low biomass regions in arid or semi-arid climates. Primary productivity is generally low, exacerbated by low rainfall, extreme temperatures, and wind. Plants and animals exhibit a wide range of behavioural, morphological, and physiological traits to secure and conserve water.	(Keith et al., 2020)
Flooded Grasslands and Savannas	Flooded grassland areas characterised by mainly edaphic grassland and semi-aquatic vegetation. Supports large mammal herds and particularly	(Dinerstein et al., 2017)

	important for mammal and bird migrations. Seasonal and tropical climate with hot summer months, although high rainfall variation.	
Mediterranean Forests, Woodland, and Scrub	Fire prone region characterised by mild temperatures of warm, dry summers and cool, wet winters. Vegetation predominantly shrubland and thicket (specifically Fynbos and Albany Thicket in the Cape region). This region supports high plant diversity and endemism.	(Dinerstein et al., 2017)
Montane Grasslands and Shrublands	Region of subtropical, high-altitude, grassland and shrubland. High rainfall in the summer months, and frequent fires, frost and grazing support these grasslands. In Southern Africa, much of this biome has been converted to agriculture.	(Dinerstein et al., 2017)
Tropical and Subtropical Dry Broadleaf Forest	Closed canopy forests and thickets with relatively high tree and vertebrate diversity. Regular annual water cycles between deficit and surplus. Complex trophic network with fungi and microbes acting as important decomposers.	(Keith et al., 2020)
Tropical and Subtropical Grasslands, Savannas and Shrublands	Grassy woodland and grassland regions with co-existence of trees and grassland regulated by herbivory and fire. Woody component ranges between absent and forest-like. Seasonal productivity peak in summer with warm temperatures and rainfall.	(Keith et al., 2020)
Tropical and Subtropical Moist Broadleaf Forest	Tropical and subtropical moist forest with high annual rainfall and low temperature variability. This biome supports high biodiversity and in Southern Africa this biome stretches along the east coast, and the eastern side of Madagascar.	(Dinerstein et al., 2017)

Figure 2: Location of the eleven countries of Southern Africa. Source: Author illustration

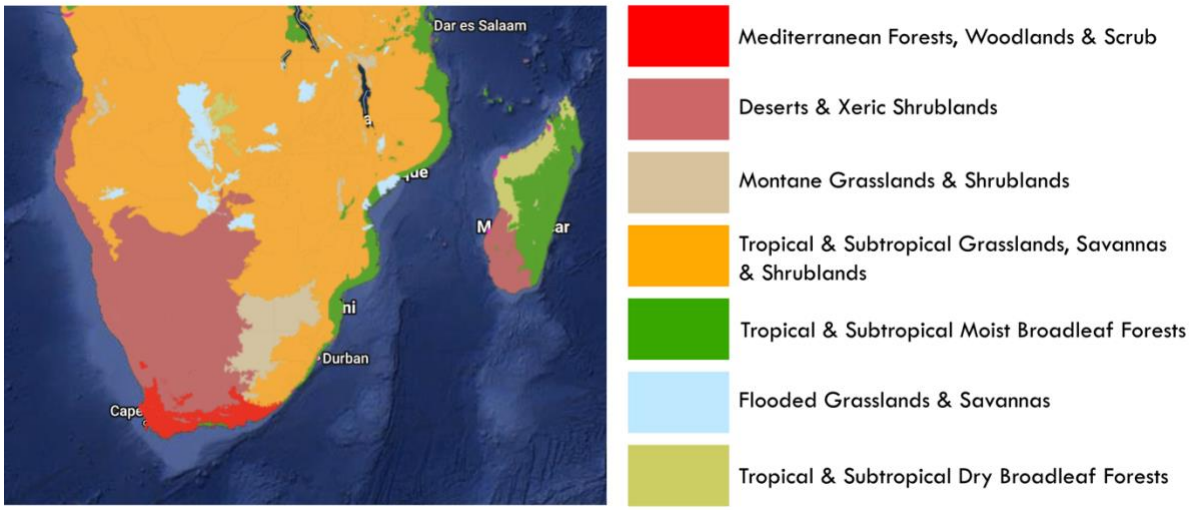

Figure 3: Biomes of Southern Africa. Source: Adapted from Dinerstein et al., 2017

3.2.2 Socio-economic context

Southern Africa represents an area with high reliance on natural resources for livelihood provision, yet changes in climate, population, land use, and economies increase the vulnerability of these resource-dependent populations and the ecosystems on which they depend (Shackleton et al., 2019). Taking the World Bank extreme poverty line as living off less than Int $1.90 per day, percentages of the population in Southern African countries living in extreme poverty range between 13.09 – 76.55% (Table 3) (Roser & Ortiz-Ospina, 2019). As such, the region is characterised by high poverty levels and a large rural population (Table 3).

Table 3: Percentage of population by country: a) living below the poverty line of Int $1.90/day in 2019, b) Rural population (% of total population) in 2020

Country	**a) Percentage**	**b) Percentage**
Angola	51.40%	48%
Botswana	13.09%	29%
Eswatini	27.53%	76%
Lesotho	28.50%	71%
Madagascar	76.55%	61%
Malawi	67.55%	83%
Mozambique	62.29%	63%
Namibia	15.95%	48%
South Africa	19.67%	33%
Zambia	58.52%	55%
Zimbabwe	39.53%	68%
	Adapted from: Our World in Data (Roser & Ortiz-Ospina, 2019)	Adapted from: The World Bank (WB, 2018)

3.2.3 Threats to Water Towers in Southern Africa

Threats to ecosystems across Southern Africa are numerous and cannot be viewed in isolation as multiple stressors can occur simultaneously, exacerbating these threats and potentially resulting in cascading or compounding threats (Jackson, Woodford & Weyl, 2016). Key environmental threats are briefly described below. With ongoing climate change, threatened biodiversity, and continued socio-economic pressures, sustainability of climate-related interventions is of increasing importance. Effective climate change action requires addressing climate, people, and biodiversity as knitted or connected systems (Trisos et al., 2022) and, as such, NbS are an attractive means to address all three.

3.2.3.1 Climate change and variability

Warming across Southern Africa has averaged more than the global average of 1.09°C (since the pre-industrial period) over the past few decades. While African countries, including those in Southern Africa, have contributed amongst the least to anthropogenic climate change, they are already experiencing a variety of negative consequences, including impacts on human health, biodiversity loss, reduction in agricultural output, water shortages, and a reduction in economic development (Trisos et al., 2022) .

A large proportion (55−65%) of the population is employed in the agriculture sector with about 95% of croplands being rainfed, increasing vulnerability to climate change. For example, wheat and maize yields have decreased by 5.8% and 2.3% respectively between 1974 and 2008, and woody plants have increased on grazing lands and grasslands reducing fodder availability for livestock and grassland-dependant species. Furthermore, climatic changes influence large freshwater bodies and river systems. For example, the temperature of Lake Malawi has increased by 0.1°C per decade and on average river flows have decreased between 1970 and 2010 (Trisos et al., 2022). Given the importance of Water Towers for water supply for human populations (Viviroli et al., 2020) and broader ecosystem function, climate change poses a significant threat to these ecosystems (Egan & Price, 2017).

Future climate risks are widespread, worsening with every fraction of warming. Increased temperatures are expected to further impact food systems in relation to growing seasons, outputs, and labour capacity. Droughts are expected to become more frequent, as is variability in rainfall and extreme rainfall events in some areas and biodiversity loss and species extinction increases with every degree of warming (Trisos et al., 2022).

3.2.3.2 Bush encroachment

Bush encroachment, the increase of indigenous woody species, has been recognised as an increasing problem in Southern Africa over the past century (O'Connor, Puttick & Hoffman, 2014). This has been linked to changes in fire regimes, cyclical rainfall patterns, a decrease in browsing herbivory with an increase in grazing herbivory and more recently, an increase in atmospheric carbon dioxide (O'Connor, Puttick & Hoffman, 2014). The general trend shows woody plant expansion across African open ecosystems, resulting in increasing threats to animal and plant communities as habitats change and increasing fire risk due to increases fuel loads (Trisos et al., 2022).

3.2.3.3 Unsustainable land use practices

Land use change has been one of the biggest drivers of ecosystem function and biodiversity loss globally over the last century (Jackson, Woodford & Weyl, 2016). In Southern Africa this is linked to deforestation, conversion of land for cultivation and increased urbanisation, as well as poor farming practices that increase topsoil erosion (Jackson, Woodford & Weyl, 2016). Furthermore, direct water use for irrigation and settlements can also negatively impact

river flow, and have inequitable outcomes for downstream users (Jackson, Woodford & Weyl, 2016).

3.2.3.4 Alien Invasive Species

Alien invasive species (including those for cultivation), particularly invasive terrestrial and aquatic plants are having increasingly negative impacts on freshwater ecosystems in Southern Africa. In particular, the higher evo-transpiration rate of alien vegetation in comparison to indigenous species reduces river flows and groundwater reserves (Jackson, Woodford & Weyl, 2016). This negatively impacts ecosystems services for both ecosystem function and downstream users.

3.3 Methods

3.3.1 Introduction

The methods for this research comprised two components: i) a systematic mapping of multilateral project documents to identify all Nature-based solution (NbS) projects of relevance to areas important to water supply in Southern Africa; and ii) an in-depth qualitative document analysis for a random subset of these NbS projects to characterise aspects of sustainability and social equity considered in NbS design and planning. To achieve these two components, I used five main steps as illustrated in Figure 4 and which I detail below.

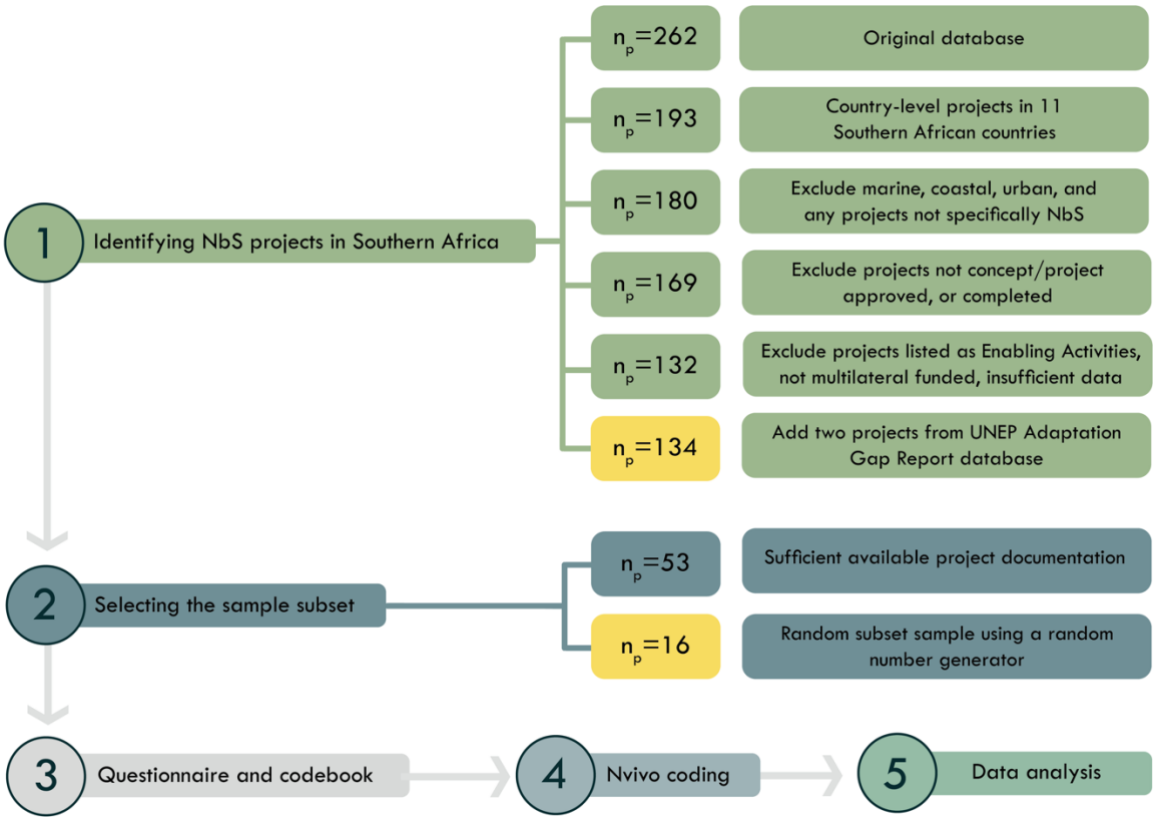

Figure 4: Flowchart depicting methodology through five steps Yellow tabs indicate the final NbS database used (n_p=134) and randomly selected subset (n_p=16)

The NbS and equity framework presented in Figure 1 (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep) was used to inform the approach to the systematic mapping and qualitative analysis in terms of concepts, categories, and linkages. A pilot project (ID170) was used to test the coding, questionnaire, and codebook and necessary edits and adjustments were made before the approach was applied to the subset of sixteen projects. From here onwards I use the abbreviation **n_p** to mean number of projects.

3.3.2 Step one: Identifying NbS projects in Southern Africa

To identify NbS projects in Southern Africa of relevance to Water Towers, I used a database of multilateral funded NbS projects compiled under TES NbS from publicly available project information for the following funds: Global Environment Facility (GEF) Trust Fund, Least Developed Countries Fund, Multi Trust Fund, Special Climate Change Fund, Adaptation Fund, BioCarbon Fund, Global Climate Change Alliance, Green Climate Fund, Adaptation for Smallholder Agriculture Programme, UN Agency for International Development, and the UN-REDD Programme. The focus on multilateral funds specifically is due to their increased prevalence in funding "global public good problems" such as climate change and loss of ecosystem services (Chan, 2019), of which NbS directly aim to address. As Chan (2019) highlights, multilateral financial mechanisms can influence both efficiency and equity and impact both local level and global level welfare, making them important financial mechanisms for global change. Furthermore, multilateral funds are some of the main financial mechanisms for the UNFCCC (Kalaidjian & Robinson, 2022) which make them particularly relevant to NbS as a means to address both climate change adaptation and mitigation. There are criticisms of multilateral funding, particularly in that they impose a heavy bureaucratic and administrative demand making access to funding, particularly for less-capacitated developing countries, difficult (Kalaidjian & Robinson, 2022). Furthermore, multilateral sources have been found to have a low disbursement ratio of only 14% compared to 57% of bilateral funding sources, which is concerning given their prominence for climate adaptation finance (Savvidou et al., 2021). Finally, given the underfunding for climate adaptation in Africa, including the key sector of 'ecosystems' as identified by African governments (Savvidou et al., 2021), investigation into multilateral funds is warranted.

The initial database consisted of 262 projects for Southern African countries including country-specific projects as well as regional and global programmes. I screened the database based on a set of inclusion and exclusion criteria, including location and project scale, NbS intervention, project status, and type (Table 4, Figure 4).

Table 4: Inclusion and exclusion criteria for the NbS project selection

1. Location and project scale	**2. NbS intervention**
First-level screening to only include projects being implemented at the country level	Second-level screening to only include NbS projects of relevance to Water Towers in

(exclude regional and global programmes) in the eleven TES NbS countries: South Africa, Eswatini, Lesotho, Namibia, Zimbabwe, Zimbabwe, Mozambique, Angola, Zambia, Malawi and Madagascar.	Southern Africa (i.e., excluding coastal, marine, and urban NbS project types).
3. Projects status	**4. Project type**
Third-level screening to only include projects that have been listed as concept or project approved and/or completed on the project webpage.	Fourth-level screening to exclude: i) projects that are not clearly multilateral funded; ii) enabling activities (i.e., projects that only focused on institutional capacity building rather than local-level interventions); and iii) projects with insufficient online information.

Screening was done using the project titles, information captured in online summaries, and project log frames. A total of 132 projects remained for analysis after applying the inclusion and exclusion criteria to the full project database. Two additional projects were then added based on the 2020 UNEP Adaptation Gap Report database (UNEP, 2021) resulting in a final multilateral NbS country-level database of 134 projects (Figure 4).

For these 134 projects all data that was originally in the database was quality controlled by cross-checking online project pages. This included the following information per project: country, implementing entity, executing entity, funder, funding amount, co-finance amount, broad focal area, and timeline. Any missing information was added, and any errors were corrected or flagged. This included removing duplicates, correcting typographical errors in project titles, and amending timeline dates to year of implementation (for projects listed as 'implemented') and year of approval (for projects listed as 'concept approved'). Each project was then catalogued based on the focal NbS type using online summaries and/or project objectives and log frames. The NbS categories used for NbS type consisted of protection, restoration, sustainable management, and creation (Table 5, Figure 1, and Annex 1).

Table 5: Broad NbS categories

Protection	Natural or semi-natural lands demarcated through effective or legal means where activities are governed by statutory or non-statutory processes, such as nature reserves, sacred forests, or conservancies.
Restoration	Degraded or farming/cultural lands returned to some prior natural or semi-natural state, through activities, such as alien plant clearing, dambo restoration, and species reintroduction.
Sustainable management	Maintenance or return of specific ecosystem functions to sustain or enhance productivity and resilience, such as agroforestry, harvesting quotas, or cover crops.
Creation	Ecosystem-like characteristics created to harness specific ecosystem-like functions, such as planting vegetation on roofs, and constructing artificial wetlands or permeable pavements.
(Holden, Hoffman & Shackleton, 2022, Holden et al., in prep)	

3.3.3 Step two: Selecting the sample subset for in-depth analysis

Multilateral funds have various documentation for project planning, and these can be accessed freely online where available. While all funds have different documentation requirements, all have some kind of: i) an initial project document that presents the project idea (such as a project information form for funds under the Global Environmental Facility (GEF) or a concept note for the Green Climate Fund (GCF)); ii) a detailed project document that extensively describes the project (such as a project appraisal document (PAD), project document (ProDoc) under GEF or Adaptation Fund (AF), or an approved funding proposal under GCF); and iii) an approval document from the funder which serves as a summary (such as a request for CEO endorsement from GEF).

The minimum requirement for selection for the in-depth analysis was a full project document (which extensively describes the project) and either a request for CEO endorsement document (which serves as a project summary and confirms fund endorsement) or an inception report. A total of 53 projects out of the full 134 project database met these latter minimum requirements. Sixteen projects were randomly selected for qualitative analysis. Given the length of these project documents and time available for qualitative analysis, the stopping criteria for the random selection was once all the main funders had been represented. Each project was tagged with a unique identifier (Annex 2) which was used to

easily navigate the database subset and then also used in the results section. For each project, the full project documentation was read and coded according to a questionnaire and codebook (see step 3 and 4). Additional documents such as inception reports (the first report post project approval), environmental and social safeguards, gender action plans, and gender assessments were also read where available. Environmental and social safeguards are a set of policies, principles, and procedures put in place to identify and mitigate negative impacts from development projects. Each funder or project implementing entity usually has their own set of safeguards (Roe, S et al., 2013).

3.3.4 Step three: Creation of a questionnaire and codebook

A questionnaire (Annex 4) and related codebook (Annex 5) were developed to capture key project information and to qualitatively investigate the extent that equity and sustainability had been considered in the planning of each of the sixteen randomly selected NbS projects. The questionnaire comprised 56 questions, structured into four parts: i) metadata (Q# 1−27); ii) social equity (Q# 28−44); iii) sustainability (Q# 45−48); and iv) monitoring and evaluation, safeguards, and risks (Q# 49−56) (Table 6). Whereas the metadata section of the questionnaire did not require any coding from the text in the project documents, for the remaining three parts of the questionnaire, coding and qualitative analysis of coded text was used to answer the questions. Question types included multiple choice, check boxes, open ended, as well as Likert scale. Likert scale questions (Q# 35, 37−39, 43, 47 and see Annex 4) were used to rank the level of detail the project document included in relation to a specific social equity or sustainability aspect by providing a range of four answer options: i) not mentioned/considered; ii) mentioned/considered only; iii) mentioned/considered with marginal detail showing how; and iv) thoroughly mentioned/considered with clear detail showing how. An example of a question for which these answer options were considered included question 37 which asks: "*Were potential benefits or burdens for different current local communities considered in the project planning documentation?*"

Table 6: Questionnaire summary (full questionnaire – see Annex 4)

Question	**Purpose**
1−27 (i)	To record broad metadata for each project, including details on the NbS and ecosystem type, societal focus, whether policy relevant terms were used, alignment with the SDGs, and what project documentation was available to use

	for the study. Project contributions to sustainable development were captured through assessing whether project goals aligned with any of the Sustainable Development Goals. Project objectives and societal focus were used to make this assessment. Details on funder, funding amount, whether the funding was administered through a direct access mechanism, implementing, and executing entities, the country, and timeline were recaptured to simplify data processing.
28−36 (ii)	To capture how the project documents have considered social equity through analysis of coded words and qualitative write-up.
37−40 (ii)	To explore and analyse whether and how benefits and burdens for local communities, future generations, and vulnerable groups have been considered in the project documentation.
41−44 (ii)	To explore and analyse whether vulnerable groups have been identified and how they have been considered in the project design, for planned implementation, in terms of impact and in terms of decision-making structures.
45−48 (iii)	To capture how the project documents have considered sustainability and whether this is related to social equity through analysis of coded words and qualitative write-up.
49−56 (iv)	To explore and analyse social equity and sustainability in project monitoring and evaluation/results frameworks, safeguarding processes, and risk profiles.

3.3.5 Step four: Nvivo coding

Coding of the project documents was done on Nvivo software through structured word searches. *Distributional equity*, *recognitional equity*, *procedural equity*, and *sustainability* served as main codes under which chosen terms (Table 7) were grouped as sub-codes. These terms (Table 7) were chosen for the word search to explore concepts relating to the three dimensions of equity and sustainability in relation to local communities in planned project sites. The chosen terms were run through Nvivo word frequency tool to highlight these in the text of the project documents. Nvivo word frequency tool ensures that stem and variations are also included in the search (Annex 5, Q# 29, 31, 33, 45).

Table 7: Word search terms

Distributional equity	income, remuneration, wages, economic opportunity, livelihood, benefits, disbenefits, fairness, capacity building, education, training, equity,

	equitable, well-being, health, security, welfare, impact, beneficiaries, gender, and distribution. Inductively added: compensation, cost sharing, maladaptation, and burden.
Recognitional equity	rights, culture, tradition, traditional, heritage, knowledge, indigenous knowledge, representation, identity, values and vision, practices, respect, and recognition. Inductively added: local knowledge.
Procedural equity	consent, transparency, consultation, participation, participatory, engagement, collaboration, joint decision-making, trust, informed, involvement, free, prior informed consent, grievance mechanism, dispute, conflict, resolution, voice, co-design, co-production, elite capture, power, and dynamics. Inductively added: perceptions, perspectives, co-developed, inclusive, included, and jointly developed.
Sustainability	sustainability, sustainable, scalability, scalable, longevity, viable, viability, continued, continue, continuous, long-term, future, future proof, and exit strategy. Inductively added: replicability.
Additional	communities, vulnerable.

Once all the chosen terms were highlighted in the project documents, the entire document text was then skim-read but with focus placed on the paragraphs in which the chosen words were identified and highlighted. Any sentence or paragraph using a searched term in relation to local communities was then coded accordingly. Additional words were inductively included due to their relevance to the three dimensions of equity and sustainability (Table 7). The terms *communities* and *vulnerable* were also included in the word search in order to capture all relevant local-level social equity and sustainability considerations that were not used in association with the other chosen search words. This meant that every reference of the term *communities* was analysed for whether it was related to social equity and sustainability in any way. Any references to vulnerable groups were also coded under a separate code (*vulnerable groups*) to capture how these groups were being considered in the project documents. Text coded that pertained to sustainability in terms of sustainable development and social equity were tightly embedded and therefore analysed and written up together in the

narratives on social equity in the results (Chapter 4.3). Text coded to social equity and sustainability in terms of project longevity, however, were written up separately (Chapter 4.4). I furthermore addressed the results on project sustainability (project longevity) and sustainability in terms of project contribution to sustainable development in the discussion (Chapter 5.8).

The focus of the coding was placed on the project plans and interventions themselves rather than on the background information provided in the project documents. When information was given with a direct link to the project itself, this was coded (i.e., when contextual information was given with a direct link to the project plan). Furthermore, most project documents included a section on baseline or associated projects within the area. These were only considered in the coding where explicit mention was made of how the planned project builds upon the work of these baseline projects. The entire sections on monitoring and evaluation (including descriptions and results frameworks/log frames), risks (risk profiles and matrices), and social safeguards were included in the word searches and fully read.

3.3.6 Step five: Data analysis

3.3.6.1 Representativeness of the sample subset (n_p=16) of all multilateral NbS projects of relevance to Water Towers in Southern Africa (the full database, n_p=134)

Bar graphs and a pie chart were used to compare the distribution of countries, NbS types, and funders (see Annex 3 for descriptions of funders in the subset) in the sample subset (n_p=16) to the full range of NbS projects in Southern Africa of relevance to Water Towers (n_p=134). A Sankey diagram was used to determine the relationship between NbS types and societal focus of the NbS projects in the subset (n_p=16). These results are presented in Chapter 4.1 and 4.2. These visualisations were created in RAWGraphs (Mauri et al., 2017), and then exported and edited in Adobe Illustrator to customise colours and improve legibility of the text.

3.3.6.2 In-depth qualitative and quantitative analysis of the NbS project sample subset

For each project document read and coded, all coded text at sub-codes were re-read and used to answer the relevant quantitative and qualitative questions in the accompanying questionnaire linked to the sections on social equity, sustainability and monitoring and evaluation, safeguards, and risks.

Nvivo-generated code hierarchies and questionnaire quantitative data were used to generate quantitative summaries (word frequencies) of the extent to which words related to social equity and sustainability were used in the project documents. Nvivo-generated code hierarchies were used as an indication of the number of times text was coded at a specific code and sub-code, while quantitative questionnaire data were used as an indication of the number of projects that mentioned the chosen terms. Likert scale questions were also summarised to provide a quantitative summary of the extent to which project documents included specific social equity or sustainability aspects. Visual representations of these quantitative summaries were generated using a hierarchy chart (created in Nvivo) and bar graphs (created in RAWGraphs). Both these visualisations were edited in Adobe Illustrator to improve legibility of the text. These results are presented in Chapter 4.3.1.

For the open-ended questions, a narrative for each chosen term (or sub-code) was developed which detailed how the terms were being used in the project documents in relation to social equity, sustainability, and their linkages. These narratives were then synthesised into one in-depth qualitative narrative for: i) each equity dimension (Chapter 4.3.2, 4.3.3, 4.3.4); ii) the linkages between equity and sustainability (Chapter 4.4); and iii) social equity and social safeguards (Chapter 4.5). Visual summaries of these qualitative narratives were developed in Adobe Illustrator, which show the most prevalent terms coded relating to the three dimensions of equity and sustainability. Monitoring and evaluation were also included in each visual summary. The visual summaries show where detail has been provided in the project documents on concepts related to the searched terms and monitoring and evaluation (as described in the qualitative narrative), and whether any concepts discussed in the project documents were linked (i.e., spoken about together). These distinctions are differentiated in the visualisations through colour and connecting lines.

Coded terms in the qualitative narratives are presented in italics for emphasis. Direct quotes from the project documents are also presented in italics and with quotation marks. Additionally, within direct quotes, certain sentences are presented in bold to emphasise the most important aspect of the chosen quote.

Chapter Four: Results

4.1 Countries, NbS categories, and funders in Southern Africa of relevance to Water Towers across the full database (n_p=134)

There was strong representation of projects in South Africa (n_p=23), followed by Madagascar (n_p=20), Malawi, and Namibia (n_p=16). Zimbabwe had the least NbS projects with only two projects represented (Figure 5). The most prevalent Nature-based solution (NbS) types across the full database were predominantly made up of sustainable management (n_p=49), protection and sustainable management (n_p=36), and restoration and sustainable management (n_p=18) (Figure 6). Most of the funding for NbS projects came from the GEF Trust Fund (68%), followed by Least Developed Countries Fund (14%), Green Climate Fund (7%), and the Adaptation Fund (4.5%) (Figure 7).

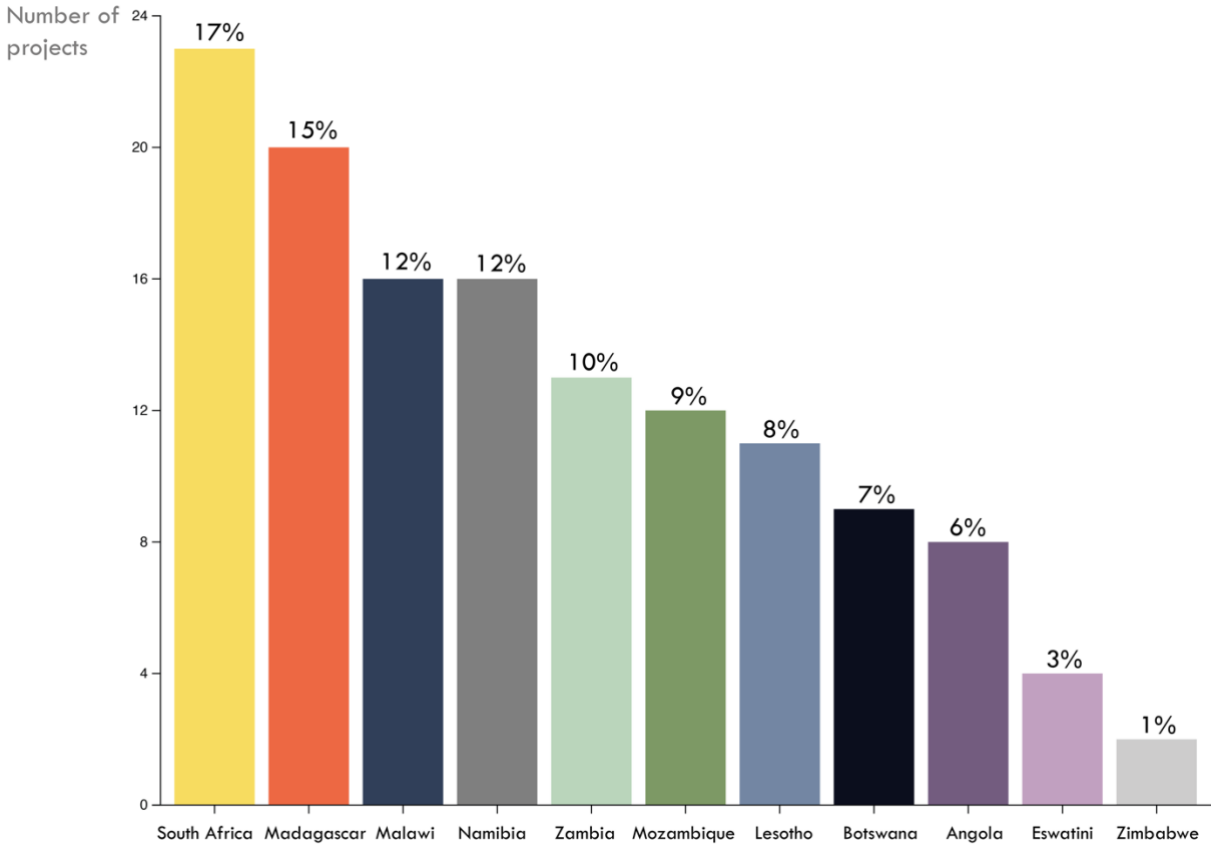

Figure 5: Bar graphs showing the number of NbS projects (y-axis) per country (x-axis) and percentages across the database of 134 projects

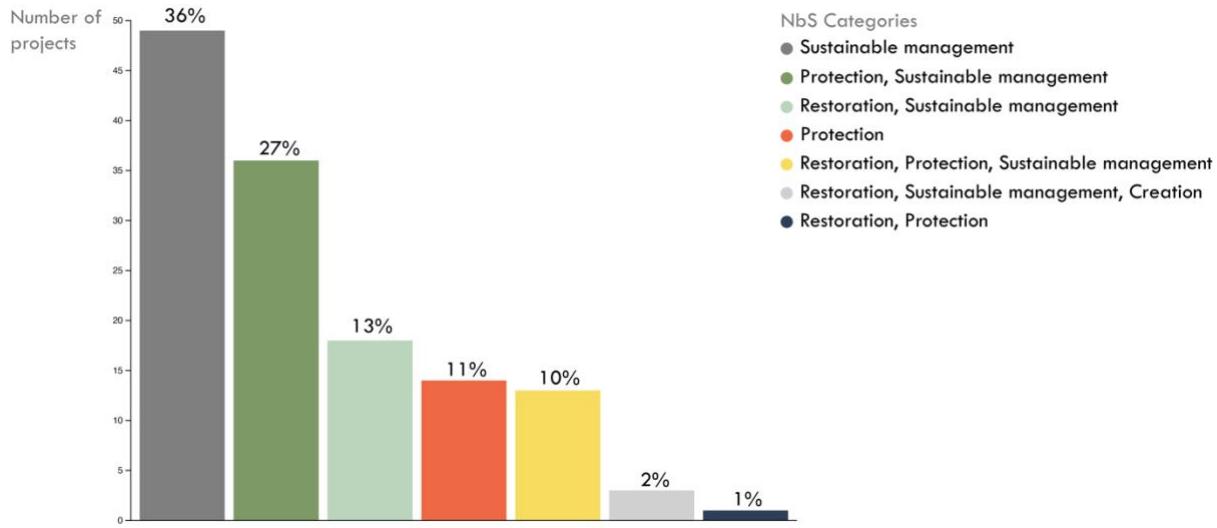

Figure 6: NbS categorisations across database of 134 multilateral NbS projects in Southern Africa

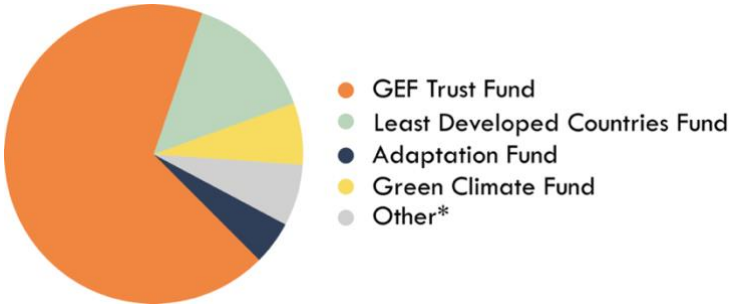

Figure 7: Funding streams for the NbS database (134 projects). GEF Trust Fund (n_p=91), Least Developed Countries Fund (n_p=19), Adaptation Fund (n_p=6), Green Climate Fund (n_p=9) and other includes BioCarbon Fund (n_p=2), International Fund for Agricultural Development

4.2 Representativeness of NbS projects in subset (n_p=16) of NbS projects in Southern Africa (the full database described above, n_p=134)

Overall, the subset had a fair representation of the NbS projects designed for the Southern African region of relevance to Water Towers. This is in relation to funding source (the main stopping criteria for the subset), country targeted and NbS categories. For example, the subset included projects located in South Africa (n_p=4), Malawi (n_p=4), Angola (n_p=3), Lesotho (n_p=2), Madagascar (n_p=2), and Zambia (n_p=1) (Figure 8). This was relatively representative of the database, particularly for South Africa and Malawi. However, Madagascar is under-represented in the subset in comparison to the broader database and Angola is over-represented.

Similar to the full database, most projects in the subset used a combination of broad NbS approaches and interventions with the majority including some aspect of sustainable management (n_p=15) (Figure 9). For the subset, this included the following interventions: conservation agriculture (n_p=9), sustainable natural resource management (n_p=9), and agroforestry (n_p=8). Under projects that had some dimension of protection (n_p=7) there was a prevalence for public-community protected areas (n_p=5).

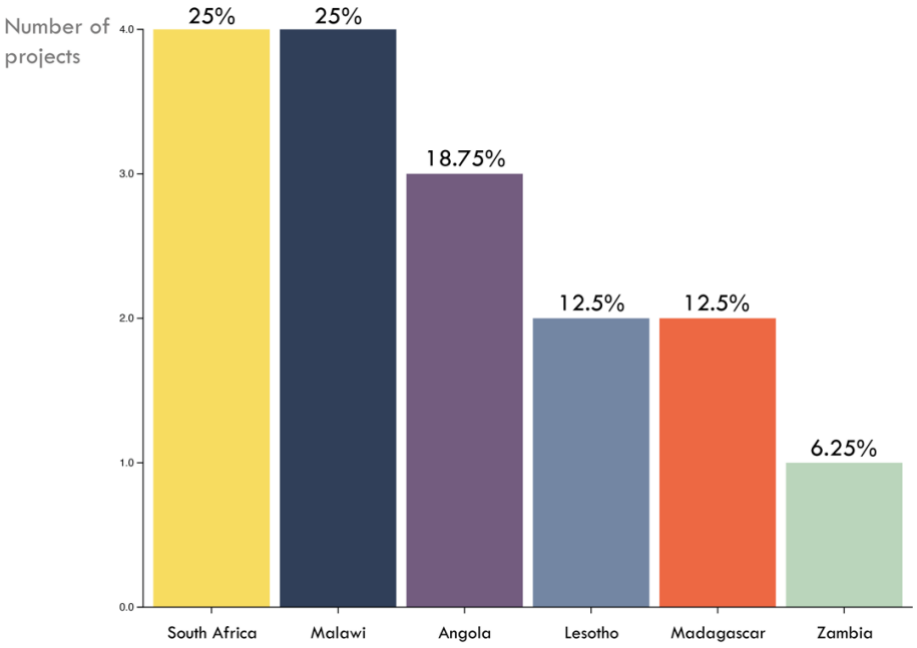

Figure 8:Bar graphs showing the number of NbS projects per country across the database subset of 16 projects

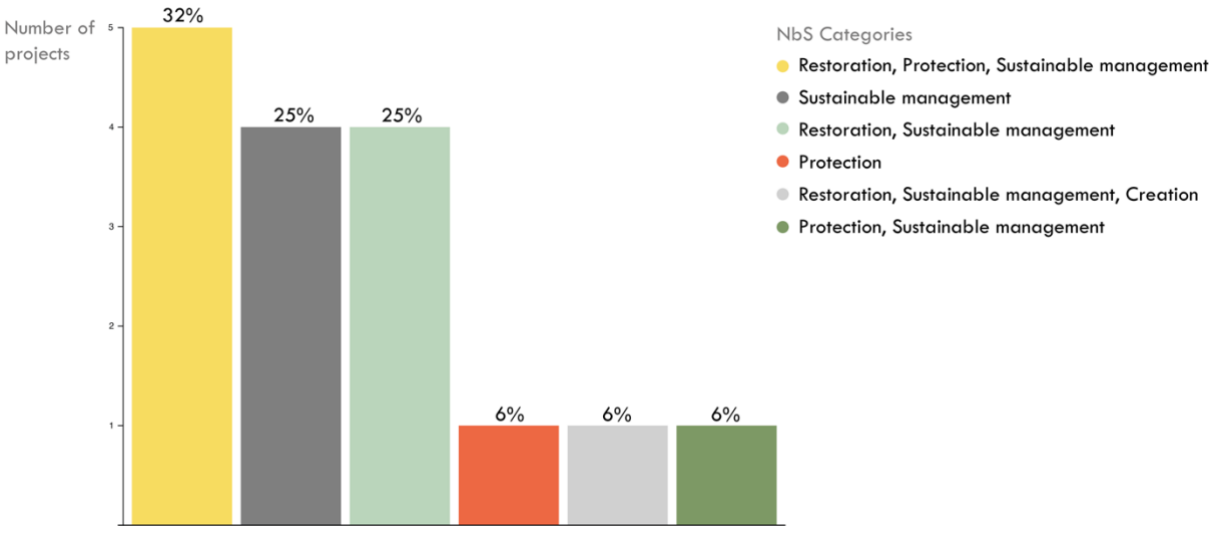

Figure 9: NbS categorisations across the subset of sixteen projects

The four funds represented in the subset were the Least Developed Countries Fund (44%), GEF Trust Fund (38%), Adaptation Fund (12%), and Green Climate Fund (6%) (Figure 10 and Annex 4 for fund summaries). The GEF Trust Fund is under-represented in the subset, while the Least Developed Countries Fund is somewhat over-represented. However, the subset does capture the four main funders for NbS in Southern Africa.

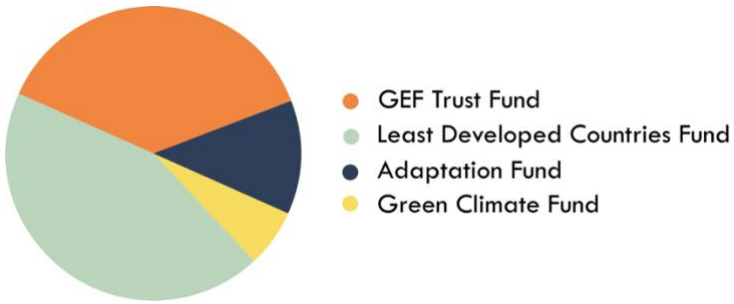

Figure 10: Funding streams for NbS subset (sixteen projects). GEF Trust Fund (n_p=6), Least Developed Countries Fund (n_p=7), Adaptation Fund (n_p=2) and Green Climate Fund (n_p=1)

In the subset, projects were generally planned for natural/semi-natural and working land areas (n_p=10), with a smaller focus on only natural/semi-natural (n_p=4) or only working lands (n_p=2). Ecosystem types described across the project documentation tended to mention more than one type with a stronger focus on forests (n_p=9), wetlands (n_p=5), and natural or semi-natural rangelands (n_p=5).

Project societal focus was generally cross-cutting but there was a clear focus on climate change adaptation (n_p=9), sustainable livelihoods (n_p=8), food security (n_p =7), and conservation (n_p =6). Both individual NbS types and combinations linked to multiple societal focuses, with sustainable management projects predominantly focusing on climate change adaptation and restoration, protection and sustainable management projects mainly focusing on conservation (Figure 11). There was only one project (ID 364) where a singular broad NbS categorisation (protection) had a single societal focus – biodiversity loss (Figure 11).

Policy-relevant terminology was not used regularly or extensively across project documentation. The most used terms were community-based natural resource management (n_p=6), community-based adaptation (n_p=4) and ecosystem-based adaptation (n_p=4). There was only one mention of Nature-based solutions specifically (ID 420).

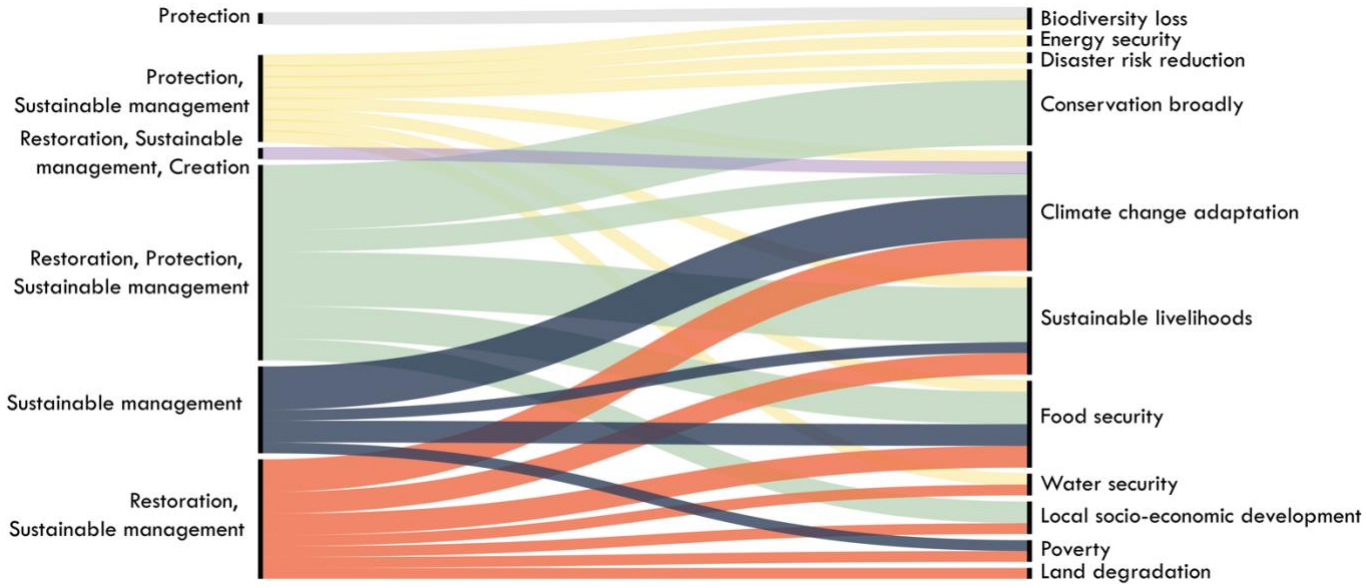

Figure 11: Sankey diagram showing broad NbS categories to societal focus across the database subset of sixteen projects

I found all sixteen projects to align with the Sustainable Development Goals in some way. Most projects aligned with #5 (Gender Equality) (n_p=13), #13 (Climate Action) (n_p=10), #1 (No Poverty) (n_p=8), #2 (Zero Hunger) (n_p=7), and #15 (Life on Land) (n_p=7).

4.3 Social equity considerations in NbS projects across the subset (n_p=16)

4.3.1 Quantitative summary of findings

All projects reviewed (n_p=16) considered social equity to some degree. However, there were variations in the: i) extent to which social equity was included; and ii) how this was addressed in the project planning documentation. Distributional equity aspects were most referenced across the project documents, followed by procedural equity and then recognitional equity considerations (Figure 12).

Under distributional equity, *capacity building*, *benefits*, and *livelihoods* were the most mentioned terms, with *disbenefits* and *fairness* the least referenced. However, projects that did explore potential negative aspects tended to refer to these using the terminology *impacts* and *risks* rather than *disbenefits*. C*onsultation*, *engagement*, and *participation* were the most referenced terms both under procedural equity and across all equity sub-codes. This shows that while distributional equity was the most explored social equity aspect overall,

c*onsultation*, *engagement*, and *participation* were the most referenced terms across the project documentation.

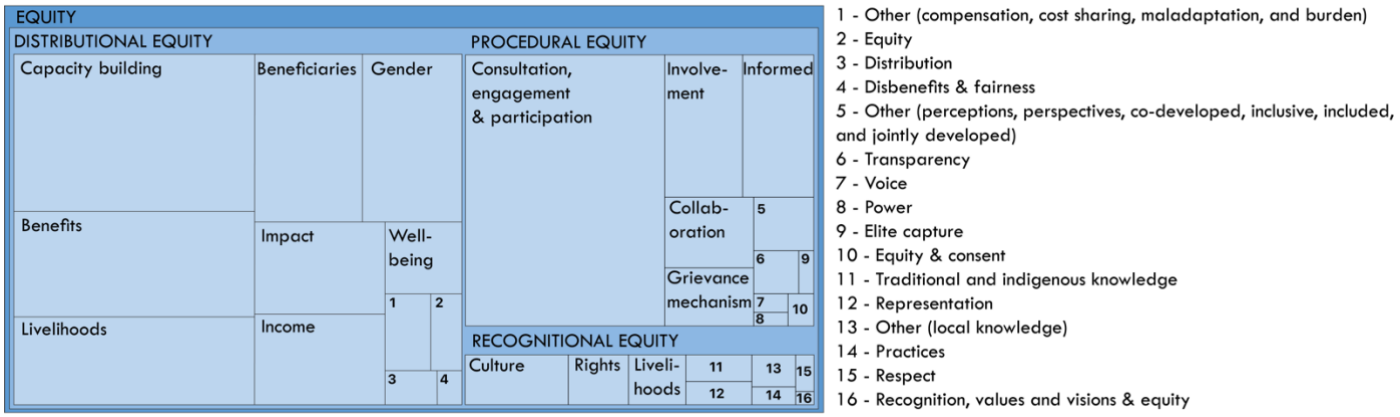

Figure 12: Hierarchy chart showing trends in the number of references coded for distributional, procedural, and recognitional equity

Terms associated with recognitional equity were least referenced, although within this main code, *culture* was the most referenced term. It is important to note that just because certain terms associated with different dimensions of equity were referenced more frequently than others, does not provide information on how these terms were being used in relation to social equity. For example, a high frequency for a specific term being used does not necessarily mean that a project incorporated one dimension of social equity more than another or in an appropriate manner. Nonetheless this does provide a broad picture of where the focus was in terms of social equity consideration in NbS project design.

Based on the analysis of the answers to the Likert scale questions, most projects showed marginal detail of how aspects of distributional equity (n_p=11) and procedural equity (n_p=9) would be addressed (Figure 13). This means that while these aspects were acknowledged in most project documentation, there was little clear detail overall on how exactly equitable distribution would be ensured within local communities and/or how they would be included in project decision-making processes. Despite being limited in frequency there was almost the same number of projects showing clear detail as to how aspects of procedural and distributional equity would be addressed. Recognitional equity was the least considered aspect, with most projects acknowledging some aspect of recognitional equity but with limited detail on how this would be addressed through the project.

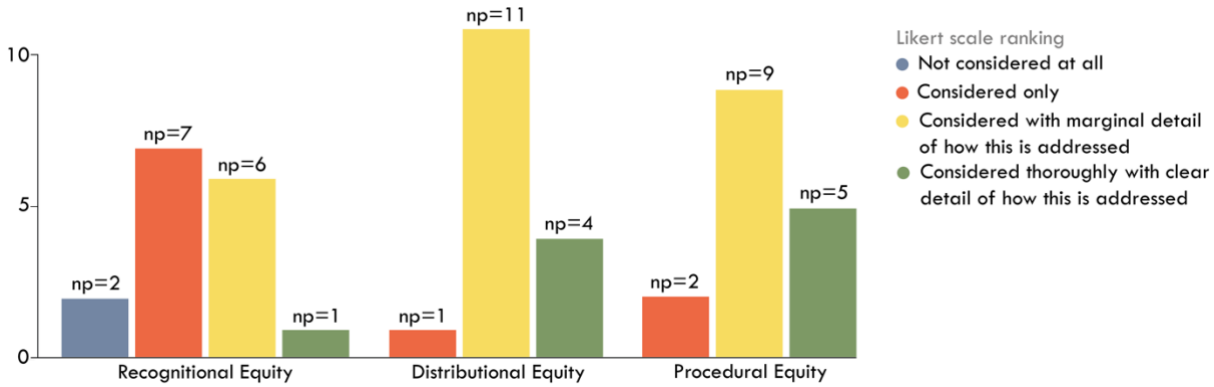

Figure 13: Bar graphs showing which aspects of equity and to what extent each was considered in project documents

4.3.2 Qualitative results: Recognitional equity

Terms relating to recognitional equity across the documentation mainly included *culture, traditional or indigenous knowledge, rights, livelihoods,* and *representation.* Figure 14 represents a visual summary of the most prevalent search terms and the concepts discussed in relation to these within project documents. The terms *respect* and *recognition* were not widely used in project documentation, and *identities* was not referenced at all. Below I focus on providing results for each of the most frequently coded terms in addition to how vulnerable groups, monitoring and evaluation, and risks were described in the project in relation to recognitional equity.

References to *culture* (*tradition, traditional, heritage*) were made across eleven projects with varying levels of depth and consideration. Most had reference to traditional authorities who were almost always said to be involved in the projects in some way. Two references mentioned a dedicated management plan for cultural resources (ID 116) or cultural heritage (ID 401). Compensation was mentioned in two projects where access to cultural heritage or natural resources was potentially going to be cut off due to the NbS project (ID 401, 161), however this was not elaborated on.

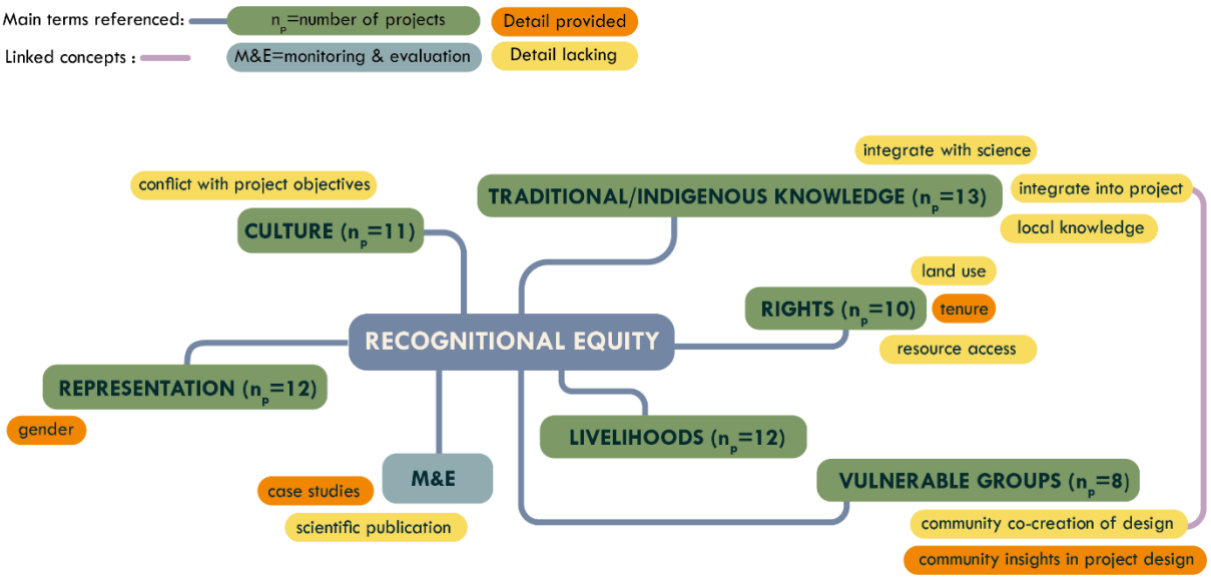

Figure 14: Visual summary of the qualitative narrative for recognitional equity showing aspects where detail was lacking (yellow tabs) or provided (orange tabs) in relation to the most prevalent search terms (green tabs) and for the monitoring and evaluation sections (light blue tab) in the project documentation. Purple linking lines show where aspects were mentioned in relation to one another

There were a number of conflicting references where local culture was somewhat at odds with achieving equity in project interventions (ID 116, 345, 420). For example, in ID 116 it stated: *"Lesotho's customary law has developed over generations and derives its force from traditional norms and cultural practices which have shaped the Basotho culture and people. Some changes to customary law can be challenging particularly as people are instilled with many of the norms enshrined in customary law.* ***One of the specific challenges, for instance, is that the patrilineal system was formalised within customary law, with a woman classified as a minor for her life****."* Here, traditional norms and cultural values were in direct conflict with attempts to achieve social equity in NbS project design and planning. How exactly this was to be overcome was not clear in the project document.

Another example was when projects did not fully account for the complexity that arises when traditional practices clash with project objectives or are the main motivation for project objectives. For example, tavy – what is described as 'traditional slash-and-burn agriculture' – was said to be the major cause of habitat destruction in Madagascar (ID 148). One of the main objectives of this project was to reduce these activities and replace them with 'sustainable livelihood initiatives' (examples given were ecotourism, beekeeping, and hunting). However, tavy plays a significant role in the livelihoods of local communities and

there was no description or consideration of whether sustainable use of natural resources and the 'sustainable livelihood initiatives,' would sufficiently meet the needs of local communities in comparison to tavy.

Interestingly, another project (ID 420) also located in Madagascar speaks more directly to tavy where: *"**The traditional agricultural system is extensive and dominated by itinerant slash-and-burn practices**, therefore constituting the main pressure on forests. The population depends on the forest for soil fertility. However, this dependence is not sustainable and goes against biodiversity conservation. **For some communities, slash-and-burn cultivation (tavy ou teviala) is perceived as a way to maintain the links with their ancestors and leads to the destruction of forest cover and to biodiversity loss**."* Here there was a recognised cultural link to tavy which clashes with principles and planned activities for the project. It was not clear how this tension would be resolved, yet there was recognition that benefits derived from the project must outweigh the value, both economic and socio-cultural, for the project to meet its objectives.

In project ID 148 cultural beliefs were mentioned to be important aspects to be considered when implementing area protection. For example: *"**The interviews with the different groups confirmed that there are many local taboos and traditions in the area (as throughout Madagascar) that dictate village life. It is essential that these are taken into account during the planning of project activities**. The best way to navigate these local taboos and traditions is to ensure that activities are carried out by or in close collaboration with the protected area managers who are based in these communities and so know the conventions very well."* This links directly to recognitional equity in that for fuller participation (and ultimately project success), local traditions need to be considered and integrated into project planning.

Traditional or *indigenous knowledge* systems were mentioned across thirteen projects, which generally spoke of these knowledge systems as needing to be integrated with scientific knowledge. However, they rarely mentioned how exactly this would be done. Project ID 305 makes by far the most references to *traditional* and *indigenous knowledge* and was also the only project that gave some detail on how this would be achieved. Here, the project detailed that a community liaison officer would be employed to integrate local and traditional knowledge into project activities. Six projects (ID 10, 116, 305, 345, 148, 420) mentioned

local knowledge and this was often with or in addition to *traditional* or *indigenous knowledge*, but not always.

Representation was used across twelve projects and mainly to speak about women's representation either in the national/local context or the project context. While this was generally said to be ensured, there was little detail across the projects on how. Projects that provided some details were: i) ID 10 with the Farmer Field School approach which was described as a way to engage with local farmers, encourage women representation, and prevent elite capture; and ii) ID 345 that stated that women will be incorporated into the decision-making process and implementation of the project through representation on the village action groups. ID 420 gave a bit more detail when it was mentioned that representation of women in decision-making was to be improved through capacity building activities, which were to be organised in a way that encouraged women participation (e.g., choosing times that are sensitive to childcare responsibilities).

References to the term *equity* as it pertained to recognitional equity specifically were minimal. Only projects ID 305 and 306 referred to recognitional equity when they spoke about equitable representation of women in the project. While most projects referenced *rights* in relation to land use, tenure, and resource access, there were mixed approaches on how this had been perceived and addressed. Project ID 19 mentioned *rights* mainly in terms of the project taking a 'rights-based approach.' This approach sets out clear guidelines pertaining to governance and social dialogue, social protection, rights in the workplace, and child labour. However, only project ID 171 mentioned actively advocating for local rights through the formal recognition of Village Forest Areas. Here it was stated that: *"The proposed project is likely to significantly improve land tenure arrangements, and traditional cultural ownership patterns. The registration of the Village Forest Areas will improve tenure of community forest resources with the attendant benefits."*

Half of the projects (n_p=8) mentioned that *vulnerable groups* had been included in the design process, but these projects provided no detail specifying who or how. Only three projects gave more detail as to the process. For example, in project ID 19, the project documentation described how the preparation phase included research, mainly through interviews, focus groups, and consultations with local farming communities (including traditional authorities and women-only groups) to understand current situations, perceptions, and needs. Similarly,

in project ID 148, household surveys on community perceptions and participation were undertaken and worked into the project design. It was clearly noted that while this had not been actively included in the results framework (monitoring and evaluation framework) due to the complexity of the indicator, the same survey was planned to be circulated after the project to track changes and improvements. This implied that qualitative data collection would be included in addition to the more quantitative monitoring and evaluation process.

Monitoring and evaluation frameworks typically showed quantitative indicators to track project progress which makes it difficult to capture aspects of recognitional equity, such as the values and visions, or perspectives of local communities. Project ID 306, however, shows an attempt to capture more qualitative data through an indicator that tracks the number of case studies capturing grant beneficiary experiences. While these experiences may not be able to be captured in the monitoring and evaluation itself, the inclusion of set targets of case studies ensures these stories are collected.

In project ID 305 the pre-inception phase was said to include consultations with community members (and other stakeholders) and included: *"representatives of community-based organisations from rural/urban communities, women, the aged and youth. An* ***emphasis was placed on capturing the views of these vulnerable groups.****"* As such, vulnerable groups were specifically identified and explicitly mentioned in project planning. This, however, does not give clear indication whether consultations would be included throughout project implementation.

One important note is that in ID 116, the project design changed from the PIF stage (initial project idea stage) to the final project design. This was due to consultations with what was described as 'various stakeholders.' An opportunity was planned to open a funding window to poor households and farmers outside of the original baseline project as it was determined that only focusing on baseline project beneficiaries would exclude those most vulnerable to impacts of climate change. This was an example where consultation led to a more equitable aspect of the project design and shows the value of understanding local context.

Projects tended to address risks related to recognitional equity to varying degrees. In project ID 19, a process-driven approach was taken, with a noted risk detailed as: *"Ethnicity and gender are highly relevant determinants of land-use traditions, but often downplayed in*

decision-making processes. ***If unaddressed these issues may aggravate pre-existing biases and inequities concerning gender and ethnicity, disenfranchising entire groups of stakeholders."*** In general, considerations of gender and ethnicity were well covered in project ID 19 with specific gender mainstreaming processes through a planned gender action plan. The gender action plan was said to be specifically monitored through the monitoring and evaluation plan and is detailed as compliant with GEF's 2018 Guidance to Advance Gender Equality and applicable Food and Agriculture Organisation safeguards and policies. It was evident in this project that ethnicity was addressed in the design of the project through extensive desk-top research and onsite consultations.

Project ID 345 lists two key risks of relevance to recognitional equity. Firstly, that the introduction of technology such as charcoal kilns may not have successful uptake if they are inappropriate for local use. This was said to be mitigated by an in-depth assessment of suitability. However, there was no clear indication of what the alternative approach would be if project technology was deemed unsuitable. Secondly, that the decentralised approach of the project may conflict with local-level customary practices which could interfere with the formation of the village action groups (the envisioned local-level platform for project activities). This risk is listed as medium, with governance structures in place to ensure that village action groups are in accordance with both national and customary law. However, the process of engaging with these 'governance structures' was unclear. Furthermore, there was no detail provided of what happens if opposing beliefs or decisions arise between project implementation plans and customary law.

4.3.3 Qualitative results: Procedural equity

The most referenced terms related to procedural equity were *engagement, participation,* and *consultation* (Figure 15). There was minimal use of words such as *consent, voice, elite capture,* and no references to *trust.* The following section presents results for each of the most frequently coded terms in addition to how vulnerable groups, monitoring and evaluation, and risks were described in the project in relation to procedural equity.

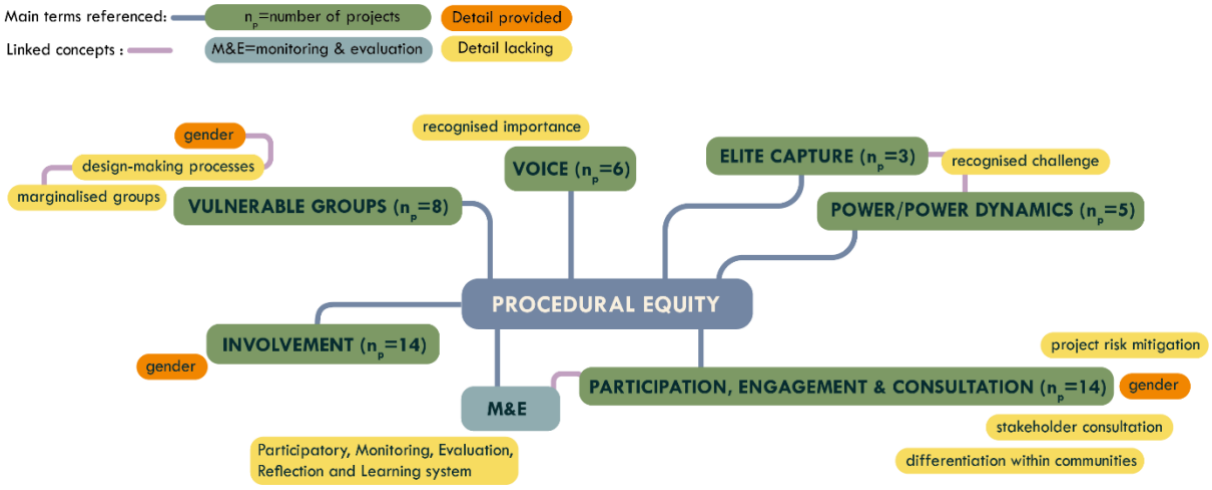

Figure 15: Visual summary of the qualitative narrative for procedural equity showing aspects where detail was lacking (yellow tabs) or provided (orange tabs) in relation to the most prevalent search terms (green tabs) and for the monitoring and evaluation sections (light blue tab) in the project documentation. Purple linking lines show where aspects were mentioned in relation to one another

A common trend in the project documents was the mention of 'extensive stakeholder consultation' when describing aspects of projects. However, it was not always clear which stakeholders were included and whether local communities or representatives were always included. Stakeholder engagement plans were also common throughout the projects and most of these had some reference to local communities, but this was not always consistent throughout the documentation. For example, ID 171 states that: *"vulnerable communities and local authorities are key stakeholders of this project."* However, they (vulnerable communities and local authorities) are not explicitly listed in the stakeholder engagement list. Rather, non-government organisations and community-based organisations are mentioned to be trained through the project to act as local partners for project development. Project ID 19 explains that planned project implementation (mainly sustainable land management training and facilitation) at the local level would be done through the Agro-Pastoral/Farmer Field School and GreeNTD approaches, which were said to be participatory and enable collective decision-making for land use.

ID 420 was the most explicit in linking *participation* to social equity for *vulnerable groups*. This consideration was most apparent in the environmental and social management plan. Firstly, the planned activities for a gender analysis and action plan were justified as evident in this statement: *"The objective of this gender mainstreaming analysis and action plan is to*

provide context on gender issues relevant to the project and to outline specific actions that will be taken within the project ***to ensure that men, women and vulnerable groups identified by the project have the opportunity to equally participate in, and benefit from, the project****. Along with the stakeholder engagement plan this plan is part of the project's commitment to equitable stakeholder participation."*

As such, *vulnerable groups* were considered, and active plans made to further identify these groups within the community. The availability of the environmental and social management plan for public viewing shows project transparency and was unique among the projects. While several projects mentioned that there would be such a plan, only ID 420 had it available online. ID 420 also had the most extensively detailed stakeholder engagement plan within their environmental and social management plan. This included details on the project preparation process and the workshops that took place. Here it was stated that: *"The overall objective of the stakeholder consultations was to involve the different actors in the final design and decision-making on the project."*

Furthermore, of relevance to ID 420 was specific mention of *vulnerable groups*, where it was stated that: *"****To maximize the opinions and inputs collected from local communities and vulnerable populations, a grievance registry, with a summary in Malagasy of the Project, was made available in each commune*** *affected by the Project in the Ankenihenv-Zahamena Corridor and Ambositra-Vondroza Forest Corridor protected areas, for a period of 3 weeks after the regional public consultation session."* This is a clear example of a specific activity that attempted to facilitate the collection of various voices. However, there was no explanation of why a three-week period was chosen or how the message was spread about the presence of the grievance registry.

As for inclusivity of *vulnerable groups* in decision-making processes, only half (n_p=8) of the projects mentioned that vulnerable groups would be included, but these lacked detail as to how this would be facilitated. Structures that were described to facilitate decision-making generally did not specify vulnerable groups but referred to local communities as a whole. That said, several projects referred specifically to women being included in decision-making processes (e.g., ID 10, 345, 170. 420).

In project ID 178, structures for active decision-making appeared to come in the form of community representatives and champions who were said to assist with protected area management planning and to relay necessary information back to the community. However, detail was lacking on this process, and it is therefore difficult to say how those living in poverty or who are marginalised specifically (despite being identified as vulnerable) were actively planned to be included in project activities and decision-making. In project ID 345, village action groups were described as participatory and democratic leadership structures which follow international best practices for community-based natural resource management. It was also stated that participatory management of the village action groups would prevent *elite capture*, but how exactly it would do this and what structures would be in place was unclear.

While *participation*, *engagement*, *consultation*, and *involvement* were all regularly mentioned and touted as key aspects of project activities, there was not always clear detail on who exactly this included – who was chosen to participate, or whether there was equitable representation. And, of those actively involved, how the benefits translated to the rest of the community. The language often used implied procedural equity (e.g., *"with the consultation and full involvement of the local communities"*) but there was a lack of information detailing how these communities were involved. An exception to this was where gender participation was specifically included, such as where efforts were said to be made to ensure the participation of women (e.g., ID 116, 420).

Both *Free, Prior and Informed Consent (FPIC)* and *consent* in general were rarely mentioned across the projects. Only three projects (ID 19, 116, 420) mentioned FPIC of which only ID 19 explicitly acknowledged that desktop research had been thoroughly undertaken to confirm that FPIC would not be required as there were no indigenous communities believed to be living in the project sites, but that the need for it would be continually assessed and implemented if necessary. Overall, concepts around consent and local communities were lacking across project documents.

The term *equity* as it pertains to procedural equity was only used in three projects (ID 113, 161, 345) in relation to decision-making and participation. Two mentions (ID 113, 345) were specifically in reference to local governance structures (village council and village action groups) whereby the related projects aimed to foster equity. ID 161 referred to studies being

undertaken in the project site working on, inter alia, conflict resolution between forest users and equitable participation in forest benefits. Results from these studies were said to inform project management. However, it was unclear exactly who was conducting this research.

While some mention of a *grievance mechanism* or *conflict resolution* was mentioned across twelve projects, few provided detail on this process (ID 148, 19, 345, 420). Only ID 148 had a well-developed and clear grievance mechanism procedure available in the project documentation.

Elite capture was surprisingly only mentioned in three projects (ID 364, 10, 345). Two projects, ID 10 and 345, state that participatory project approaches would avoid or prevent elite capture, whereas ID 345 highlighted elite capture as a significant challenge in the project site context. References to *power* or *power dynamics* were mentioned in five projects (ID 19, 148, 171, 420, 345) and, while the importance of them was stated, there was little detail on how to address them. A reference of relevance as it provided some detail was in project ID 19 which planned to adopt the Farmer Field School (FFS) approach (Table 8). In this instance, power dynamics were recognised to impact outcomes. As such, the process of engagement with local communities requires consideration as this is itself a procedural equity consideration. However, while it was mentioned that these aspects should be 'taken into account,' there was a lack of detail on how this would be done.

The word *voice* was only used in six project documents with project ID 305 showing the most references. However, ID 364 and ID 420 had the most relevant uses of the term (Table 8), which integrated the importance of local voices in project planning and implementation. While this recognition links directly to procedural equity, it was not entirely clear how this would be ensured and what these strategies would be. There was mention of working with other organisations but there was still a lack of detail of what approaches would be taken to 'hear' community voices with the exception being ID 420's grievance registry.

Additional words coded were *perspectives* which came up in two projects (ID 305, 171) and *perceptions*, which also showed in two projects (ID 148, 178). These four references focused on gathering local-level perspectives and perceptions either on climate resilience and vulnerability (ID 305, 178), on attitudes and perceptions of protected areas (ID 148), and in project ID 178 specifically on perceptions of alien invasive species through a cost-benefit

analysis. Local-level perspectives and perceptions were said to: i) assist in identifying adaptation measures (ID 171); ii) inform project indicators (such as around food security) and measure changes (ID 148); iii) inform cost-benefit analysis of alien invasive species; and iv) facilitate the consideration of vulnerable groups in policy recommendations at the municipal level (ID 305). A quote from project ID 305 captured this in relation to a planned workshop (Table 8) and as such showed how these local-level perspectives were planned to be heard in the project process. Furthermore, special attention was said to be given to vulnerable groups in project implementation through mentoring and encouragement. The gender and social action plan was described to form an integral part of the inclusion of vulnerable groups.

Table 8: Quotes of relevance to terms power, voice, and perspectives

Project ID	Term	Relevant quote
ID19	power	*"The active inclusion of all actors in territorial development interventions is crucial for sustainable development, because it allows recognizing the key role that each of the stakeholders plays,* ***existing power asymmetries within communities, households and institutions, and how they influence people's capacity to play an active role in development and be assured that they are heard****."* *"The more horizontal and inclusive model of collective organization of FFSs (based on the sharing of experiences and knowledge) came to clash with engrained habits of more authoritarian and centralized distribution of power and responsibilities.* ***Such tensions should be taken into account during the project's implementation while engaging communities and local partners****."*
ID 364	voice	*"****It will be extremely important to ensure that the community voice is heard on this outcome*** *(Outcome 3.1: Functional community governance mechanisms for sustainable livelihoods and reduced rate of illegal wildlife trade) and that the development of livelihood projects is not driven from a top-down approach* ***but responds to actual needs and priorities of the communities at the target clusters****."*

ID 420	voice	*"The Project will* ***ensure that there are a number of different strategies in place that will allow vulnerable groups to openly voice their opinions on specific issues.*** *At the same time, the* ***Project will ensure that these strategies are sensitive to local cultural norms and do not inadvertently encourage a deepening of power imbalances****. These strategies will need to include men and encourage their active support for the Project and avoid singling out women as primary agents responsible for resource management decisions."*
ID 305	perspectives	*"This workshop will include community members so as to facilitate the consideration of the perspectives of vulnerable groups in the policy recommendation process."*

Procedural equity was captured in monitoring and evaluation frameworks through indicators that track involvement (such as number of plans developed, number of people involved in preparation of the plans, of which how many are women, and number of communities involved in development of plans). For example, ID 116 included an indicator that tracked the number of beneficiaries who felt equipped to deal with climate change and variability, which is a more qualitative approach. There were various depths of detail given as to how this information would be collected but most projects indicated surveys. Project ID 305, for example, indicated the use of reflection workshops to gather on-the-ground information of people's perceptions and experiences. While there was one mention of vulnerable communities in relation to reflection workshops, how these groups were differentiated and sought out was unclear.

Project ID 171 noted a specific approach for monitoring and evaluation called Participatory, Monitoring, Evaluation, Reflection and Learning system (PMERL). This approach was said to include participatory indicator development. While there were several specific indicators that were said to still be needed, their plan was to include: i) community involvement in monitoring vulnerability; and ii) a number of comprehensive community-based adaptation plans integrating traditional and technical knowledge. While these planned inclusions in the PMERL link to both recognitional and procedural equity, how exactly the indicators would

capture equity aspects was not yet clear. However, PMERL shows consideration for iterative and inclusive indicator setting and project monitoring.

A common trend across projects under risk assessments was the consideration of a lack of community participation due to the following reasons: i) lack of community-level interest or commitment (ID 1); ii) lack of interest in adopting introduced technologies or approaches (ID 1, 10, 116); iii) potential conflict in the management of communal resources (ID113, 116); and iv) introduced practices clashing with local cultures, resulting in slow adaptation of actions (ID19, 420). Mitigation of these risks generally followed a similar theme of participatory project approaches, creating a sense of local ownership, focusing on practices with local-level acceptance, capacity building, and through demonstrations and awareness campaigns, negotiations, and conflict management. This participatory focus showed consideration of procedural equity; however, there were gaps in detailing who exactly would participate in each case and how this would be determined.

4.3.4 Qualitative results: Distributional equity

Across the project documents, there was a general focus on *income*, *livelihoods*, *benefits*, *beneficiaries*, *capacity building*, and *gender* as shown in the visual summary in Figure 16. There was less attention on *disbenefits*, *fairness*, and *distribution*. Below details results for each of the most frequently coded terms in addition to how *vulnerable groups*, monitoring and evaluation, and risks were described in the project in relation to distributional equity.

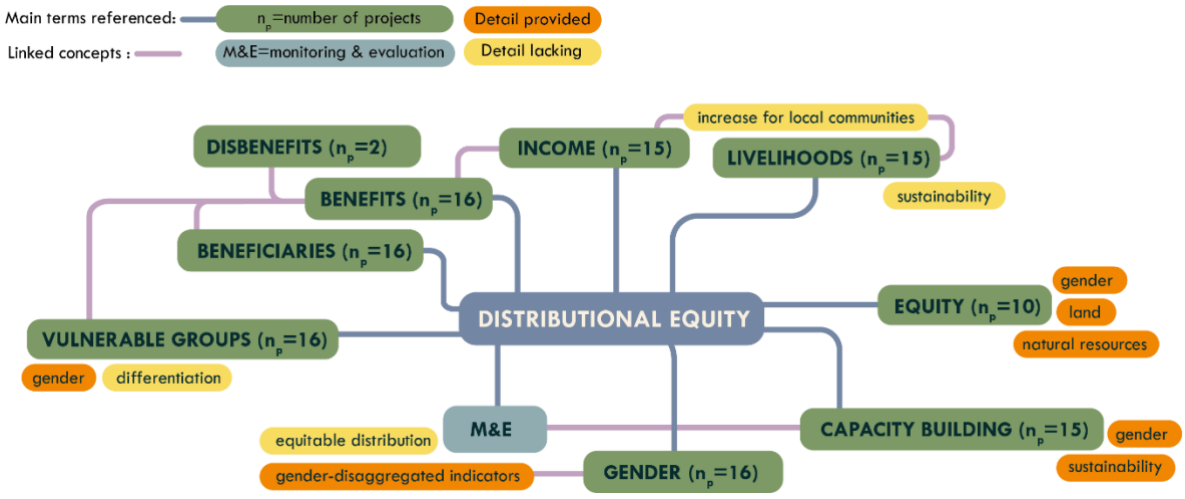

Figure 16: Visual summary of the qualitative narrative for distributional equity showing aspects where detail was lacking (yellow tabs) or provided (orange tabs) in relation to the most prevalent search terms (green tabs) and for the monitoring and evaluation sections (light blue tab) in the project documentation. Purple linking lines show where aspects were mentioned in relation to one another

Across fifteen projects, NbS activities were said to increase or improve *incomes* and/or initiate income-generating activities for local communities. These income-related outcomes of NbS activities were regularly said to be through some form of improved agriculture (e.g. conservation agriculture or agroforestry) which intended to increase yields, or through sustainable natural resource management, particularly in projects working within or near protected areas. Most project documents noted the financial vulnerability of local communities and their dependence on natural resources and recognised the linked need for development in NbS projects. For example, this is seen in project ID 401 where: *"A key lesson has been the* ***importance of integrating community income improvement activities with conservation to reduce the pressure of local communities on natural resources*** *and increase their incentive to sustainably manage natural resources."*

What was not clear in any of the project documents was whether the current natural resource harvesting rate was meeting the needs of local communities. Furthermore, whether and how sustainable harvesting would meet local-level needs and the level to which income improvement activities would cover the opportunity costs of reduced harvesting. This was particularly where current levels of 'land exploitation' were listed as one of the key challenges the project aimed to address. There was also little detail on what exactly sustainable harvesting looked like or what techniques or approaches would be used.

Similarly, sustainable *livelihoods* were mentioned across several projects (e.g., ID 345, 170, 148, 420) in connection with sustainable natural resource management. ID 148 in reference to local community natural resource use adjacent to protected areas in Madagascar refers to sustainable resource use rather than preventing local communities from accessing these areas. For example: *"In the case of these three protected areas, significant amounts of regulated natural resource use are permitted.* ***Hence in these cases the behaviour change is more about promoting sustainable use of the existing resources rather than stopping use altogether****."* However, the project documentation does not make clear what sustainable levels are and how many people or households could rely on this approach. It also does not mention who or how individuals or households would be chosen or allocated for resource access. As such, while equity was considered in terms of continued resource use, it was unclear whether and how resources would be equitably distributed and whether this would consider those most vulnerable.

Livelihoods was also mentioned within project risk analyses. A key theme that came up as a risk was the potential for *livelihoods* (and *income*) to not be sufficient in the alternatives provided through or by the project and, as a result that: i) sustainable natural resource management will be further compromised (ID 170, 161, 148, 420); ii) biodiversity will be further compromised (ID 401); and iii) there could be continued threat of uncontrolled exploitation of natural resources (ID 148). This complexity was highlighted specifically in ID 161 where the project-related Trust was discussed: *"The much greater risk is in relation to the expectations of the local communities with respect to what the Mount Mulanje Conservation Trust (MMCT) can provide in terms of financial assistance and what the Mount Mulanje Forest Reserve can provide in terms of resources extracted on a sustainable basis.* ***There is a risk that the MMCT project activities will not be adequate to have a measurable positive impact, in view of the underlying factors which threaten the massif's biodiversity****, (i.e., population growth, poverty and land insecurity)"*

Finding the 'right' balance of sustainable resource management and adequate benefit (including revenue) sharing that meets the expectations and needs of local communities, particularly when current resource demands have resulted in over-exploitation of natural resources, is an unaddressed underlying tension observed throughout most of the project documents. For example, in project ID 161 is stated that: *"****Participatory rural appraisals would be undertaken of the community's traditional systems*** *of natural resource use and conservation.* ***This would identify which resource uses are sustainable and which are unsustainable****. Based on the surveys, sustainable use initiatives would be identified for implementation by the communities under the project."* While this participatory process also links to procedural equity, there were still gaps in the detail on how resource use which was deemed unsustainable would be addressed, how sustainable initiatives proposed would meet the level of need of local communities, and whether the outcomes of these sustainable initiatives would be equitably distributed within the community.

Other risk mitigation measures described across projects to balance sustainable resource management and adequate benefit (including revenue) sharing included: i) adopting a process of assessing business plans before financing small- and medium-sized enterprises (ID 401); ii) quotas in terms of forest resources (ID 170); and iii) establishment of co-management agreements for protected areas (ID 148). There were very few details on the co-management

agreement plan in project ID 148, which made it difficult to understand whether an attempt at equitable management structures had been made.

All projects spoke about *benefits* at the local level in some form, and these were generally linked to the project societal focus. Projects focused on climate change adaptation specifically noted benefits related to increased resilience to climate change impacts (ID 305, 345, 171, 306, 116, 420). Projects that had any kind of agriculture focus tended to mention benefits related to increased yield (ID 1, 170, 148), although there were certainly overlaps (ID 10). A focus on conservation in projects was generally aligned with benefits related to natural resource access of some kind (ID 161, 170). Twelve projects that referred to benefits for local communities did so with marginal detail in terms of how this would be supported. Therefore, while project benefits were listed or described, there was little detail showing how these would be facilitated or how they would be distributed across the target communities.

Four projects did, however, provide clearer detail as to how benefits would be facilitated or distributed. In these projects the approaches given to facilitate benefits included: i) through a gender and social action plan (ID 305) and an environment and social management plan (ID 420); ii) indicators in the monitoring and evaluation framework that would track 'increased income and decreased food insecurity' with data obtained through household surveys (ID 148); and iii) a dedicated section in the project document focused on benefits for women, such as access to finance and climate-related information (ID 116). Project ID 420 provided a clear breakdown of benefits with what was termed 'enhancement measures.' These included additional capacity building activities and training for local communities and access to funding. These approaches, while being more detailed than most other projects, did not specify community differentiation. So, while *vulnerable groups* as a whole were mentioned to be supported, there was no clear and explicit plan to identify these groups within project sites.

Overall, projects focused predominantly on project benefits only, with very little attention given to potential *disbenefits*. Most projects did not mentioned *burdens* or *disbenefits* at all (n_p=10), and most noted that there were no perceived negative impacts. Only three projects acknowledged potential disbenefits, and three projects gave marginal detail as to how these would be addressed. For example, project ID 305 stated that there were no foreseeable burdens (or negative impacts) anticipated by the project but that an: *"Environmental and*

Social Risk Management Plan has been developed ***to ensure that any unintended adverse impacts are avoided****, and that, where this is not the case, they are timeously detected and appropriately mitigated."* This tended to be the most typical way potential negative outcomes were framed.

Project ID 401 used the term *impact* to describe potential negative outcomes for local communities as per the project activities, mainly potential resettlement with potential livelihood losses and relocation. A resettlement policy framework and process framework were listed as being developed for the project, with the potential for a resettlement action plan being developed if resettlement became a reality. The possibility of resettlement in this project rested upon various environmental and social assessments and compensation was also mentioned. This risk appears to have been thoroughly considered and was one of few examples of potential disbenefits of a project being addressed. It must be noted that this also links to the social safeguard process which triggered the safeguard on resettlement. ID 420 provided the most thorough detail of potential negative impacts in a well-developed environmental and social management plan. This project (ID 420) also had one of the most extensively detailed risk breakdowns, while noting that the project aimed to minimise any negative impacts. This project seemed to take a more precautionary approach than most.

Capacity building (including *training* and *education*) was integrated into fifteen projects. Capacity building in climate change adaptation projects focused mainly on increasing resilience of local communities to climate change impacts through some form of sustainable management training (new agricultural practices or early warning systems, for example). In contrast, projects focused on protection for biodiversity loss or conservation broadly used capacity building with the aim to increase governance effectiveness at a higher (national or district) level with only five projects clearly including an aspect of community-based natural resource management. As such, in conservation-focused projects, *capacity building* at the local level is mainly referred to in terms of building awareness with only a few mentions of actively capacitating or including local communities into governance structures.

Capacity building was also referenced as a mitigation measure against project risks in project ID 171 where illiteracy levels were listed as a risk for project implementation. Here, capacity building and training were said to: *"disseminate project lessons via workshops, television and radio programmes in local languages to ensure that they reach a larger audience."* There

was no mention, however, of how many local communities had access to television or radio and whether the choice of dissemination was a result of community-level research. Here there was a lack of detail concerning distributional equity in terms of who would have access to the information depending on the communication medium, and who would miss out.

Most project documents use the term *beneficiaries* to describe the local-level individuals or communities who would benefit from project interventions. However, language varied across the documents, and some (e.g., ID 148) referred to these groups purely as 'local communities' with no differentiation. References of the term *equity* itself as it relates to distributional equity showed up in ten projects with varying degrees of integration. These were particularly in reference to access to natural resources (ID 10, 161) and land (ID 19). For example, in ID 10 *equity* was mentioned in terms of a policy developed specifically for the project – Voluntary Guidelines on the Responsible Governance of Tenure. These guidelines were said to be important for natural resource management systems and equitable resource access to "…***promote secure tenure rights and equitable access*** *to land, fisheries, and forests as a means of eradicating hunger and poverty, supporting sustainable development and enhancing the environment."* Project ID 345 spoke of equitable access being facilitated through participatory mapping exercises, where it stated: *"The participatory resource-mapping process will actively engage with vulnerable groups such as women, youth, and the elderly. This will ensure that the results of the mapping exercises include the priorities of these groups in the zoning of areas for various types of resource and land-use. This will also* ***take various land tenure arrangements into account to ensure equitable resource access to all groups*** *in the resource zoning."* This was one of the few examples that provided an indication as to how equitable access would be enabled.

The term *distribution* itself was not regularly used in the language across the project documents. The general lack of language around distribution means that while benefits were regularly mentioned, how these would be distributed within local communities was unclear. Two specific references, however, spoke of distribution of resources being a local governance responsibility through: i) village action groups created through the project who were to manage forests and be responsible for equitable benefit distribution 'according to community priorities' (ID 171); and ii) where village district councils would be trained in 'equitable distribution of water, collection of revenues and operations' (ID 345). The term was also used in an interesting way in ID 420 when talking about funding: *"The Investment Fund prioritises*

environmental (climate change, conservation) and social impacts over profitability and ***therefore aims at distributing a larger-than-usual portion of the value creation to local stakeholders*** *(communities involved in the sustainable agriculture production, NGOs involved in conservation, etc.)."* Here, there was reference to finance access with a larger portion being allocated to those who need it more. However, there was no clear indication of how the 'local stakeholders' would be differentiated. As such, it was not always clear who exactly was benefiting within the community or whether vulnerable groups within local stakeholders were identified.

All projects made some reference to *vulnerable groups* in relation to the distribution of benefits or beneficiaries, with varying degrees of depth and detail. Thirteen projects explicitly mentioned women, some noting gender-based vulnerabilities and others not describing women as vulnerable exactly but adding a gender-based focus. The term *gender*, however, is mentioned across all projects with varying levels of detail and is referenced regularly in terms of gender equity. Project documentation generally referred to fund requirements of some form of gender action plan. Out of all the projects, project ID 305 mentioned gender considerations the most across its project documentation. This project, along with ID 113 and ID 420, explicitly referred to the hiring of a gender expert for the project team. Generally, projects included gender-disaggregated indicators in the results framework to track gender progress (particularly IDs 116, 10, 113, 345, 148, 306, 420). This meant that gender percentage targets were set and tracked, such as 'number of women participants.'

Farmers (n_p=8), poor households or individuals (n_p=8), and youth (n_p=6) were most referenced in addition to women across the project documentation. Gender differentiation in youth was never distinguished. Several projects (e.g., ID 161, 401, 19, 148) described local communities in the project area as vulnerable as a whole and did not differentiate individuals or groups within these communities as being more, or less, vulnerable and for what reasons.

These non-differentiated statements of communities were included in assessing how vulnerable groups have been considered. For example, in project ID 178, it stated that: *"The project will make an effort to avoid inequitable or discriminatory negative impacts on the quality of and access to resources or basic services, on affected populations,* ***particularly people living in poverty or marginalized or excluded individuals or groups****."* While this kind of comment in the project documentation is noteworthy, it did not indicate how these

efforts would be done, how vulnerable people would be identified, or what 'making an effort' meant exactly. Later in the document was mentioned that social and environmental assessments would be undertaken which could link back to this, but this was not explicit.

Project ID 305 noted *vulnerable groups* regularly, including that they would be specifically included in both project participation and any benefit sharing which was to be ensured through a gender and social action plan. As this plan was not available in the project documents, however, it was unclear what strategies or approaches would be used to ensure vulnerable group inclusion and equity in benefit sharing.

All projects had high-level aspects of distributional equity integrated into the monitoring and evaluation frameworks through the inclusion of indicators that track the number of individuals or communities who have received some form of benefit (such as training, farming equipment, grants, access to information, or access to improved flood management), or a percentage of change (such as increased agriculture yield, increased incomes, or post-harvest losses). However, for most projects measuring whether these benefits would be equitably distributed was not factored into the monitoring and evaluation framework.

There were some specific mentions of *vulnerable groups* in relation to distributional equity, such as ID 161, which indicated that it would measure the level of impacts and opportunities for disadvantaged groups. However, this was not elaborated on, and it was therefore unclear how these disadvantaged groups would be identified and what methods of data collection would be used to understand these impacts.

An exception was ID 113 where an attempt to capture a more nuanced understanding of project benefits was made, where: *"The data collection will be followed with a combination of household level survey and participatory approaches. Participatory methods allow the farmers groups to identify changes in behaviour resulting from the adaptation project**. It will also help to look at distributional effects through who has benefited and who has not**. This method also helps us to identify the strengths and weaknesses of the projects for future intervention, replication and up-scaling."* This approach spoke to both procedural equity (in terms of participatory data collection) and distributional equity (in terms of project outcomes). It also notes sustainability with the use of the word's 'future', 'replication' and 'up-scaling.'

Most projects (n_p=10) had clear gender-disaggregated indicators in their *monitoring and evaluation* frameworks, which were said to be collected through various methods such as gender-specific surveys and focus groups. These all attempted to track involvement of women across various project activities. The targets, however, vary greatly from 20% to 100% and it was unclear why specific targets were chosen.

4.4 Social equity and project longevity (sustainability) across the subset (n_p=16)

This section only focuses on project sustainability in terms of longevity (i.e. the sustainability of the project beyond the funding period). The most common terms used throughout the projects were *sustainability* (and *sustainable*), *long-term*, *future*, and *scalable* (and *scalability*) as seen in the summary in Figure 17. There was little mention of *longevity*, *viability*, and *exit strategy*. Some projects linked social equity to project sustainability to varying degrees while others did not make links at all. The next section provides results for the most frequently coded terms in addition to how vulnerable groups, monitoring and evaluation frameworks, and risks were described in the project in relation to project sustainability, and how this was linked to social equity.

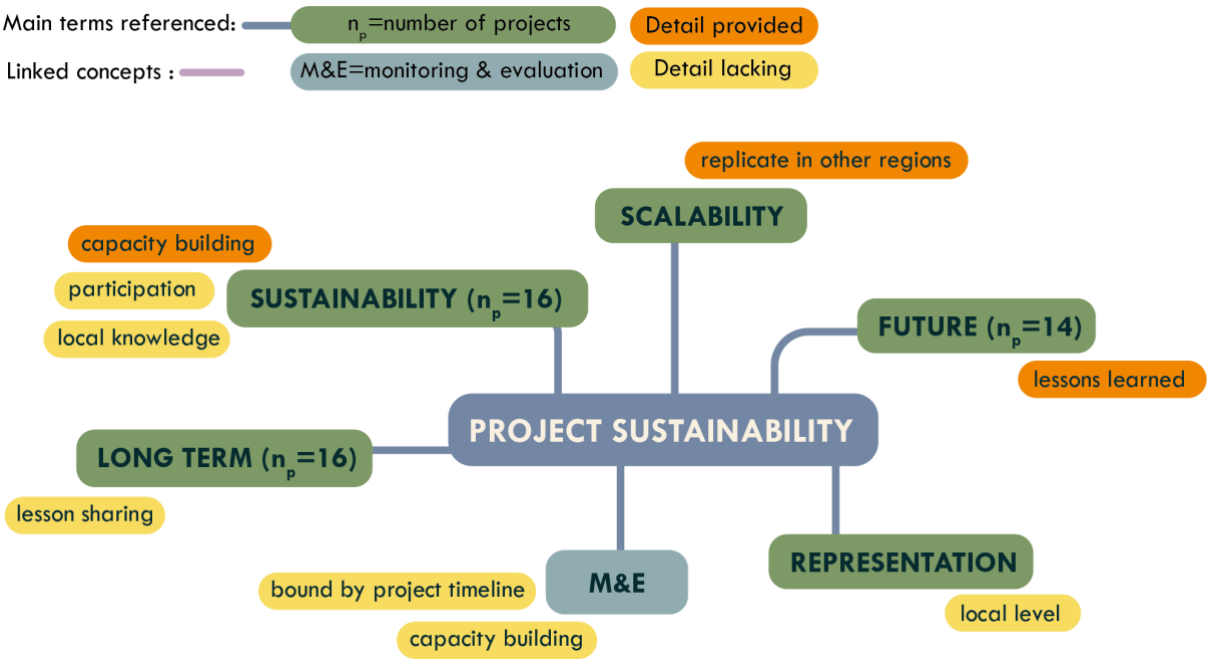

Figure 17: Visual summary of the qualitative narrative for project sustainability and linked equity showing aspects where detail was lacking (yellow tabs) or provided (orange tabs) in relation to the most prevalent search terms (green tabs) and for the monitoring and evaluation sections (light blue tab) in the project documentation. Purple linking lines show where aspects were mentioned in relation to one another

All sixteen projects used the term *sustainable* in describing the project plan, with project ID 148 showing the most references, followed by ID 305 and 116. A common theme was the use of capacity building and training which was regularly said to ensure sustainability of projects (ID 1, 10, 113, 19, 345, 170, 420). Most projects (n_p=10) listed capacity building and training at national and district or local level to be key for project sustainability (n_p=9). This multi-tiered approach was directly linked to sustainability in several project documents, as shown by the quotes in Table 9.

Table 9: Quotes of relevance to capacity building and sustainability

Project ID	Term	Relevant quote
ID 113	Capacity building	*"A major component of the project is* ***strengthening capacity at national, district and community levels and this will ensure sustainability****. This means capacity building empowers stakeholders at all levels to deal with climate change impacts and this will be sustained beyond the life of the project."*
ID 171	Capacity building	*"The project is* ***strengthening and building the already existing local structures****. It has proven in many countries that the involvement of grassroots organizations ensures sustainability of the program."*
ID 161	Capacity building	*"****The long-term viability and sustainability of the project interventions will also depend greatly on institutional sustainability. This will be achieved through capacity building at all levels,*** *following the principles of integrating the project from the onset into on-going ministerial and departmental programmes rather than launching it as a mere project. Thus, the capacity building components of the project will empower stakeholders at all levels, from community to district authorities to national government agencies, to deal with climate change impacts and enhance the adaptive capacities of the Basotho beyond the time limitations of the project."*

Projects that had a focus on protected areas mentioned park authorities as being the main structural element for project sustainability. For example, it was stated in project ID 401: *"The iSimangaliso Authority provides the institutional framework for sustainable development and conservation in the greater iSimangaliso region.* ***The project will rely on the existing administrative and organizational structures of the Authority to implement activities, which will continue after the end of the project****."*

Here, the park board was said to include a range of stakeholders (which included local community representatives) and this representation was the only explicit reference to a form of social equity in sustainability structures. In project ID 161, the Mulanje Mountain Conservation Trust (also listed as an executing entity of the project) was the main structure to see project interventions continued post project period. The Trust was also said to have local level representation and to provide a mechanism for ongoing funding after the initial project funding ended. Only two projects clearly indicated local-level structures (organisations, associations, groups) (ID 345, 148) for sustainability of project interventions. For example, in project ID 345, local level structures were in the planned formation of local-level village action groups, which were legally recognised and said to represent local communities. However, there was limited detail on how exactly these groups would be formed to ensure equitable representation of the communities they represented.

Various other structures mentioned across projects included: i) a communication and advocacy campaign that would ensure sustainability by creating awareness around climate issues and adaptation strategies (ID 171); ii) a local-level community savings scheme for ongoing project-related activities (ID 171); and iii) intention for mainstreaming of protected areas in regional and municipal development plans (ID 148) and for informing national policy (ID 178). Two projects (ID 113, 19) indicated that a sustainability plan would be formulated during the final project evaluation.

Overall, projects mainly listed *capacity building* as the key to project sustainability and while this links to distributional and procedural equity at a broad level, there was limited detail on local-level structures or their formation process. A trend observed across projects was linking community level *engagement*, *participation*, and *involvement* to sustainability (n_p=8). For example, quoted here: *"****A participatory approach is essential to sustainability****. It creates a sense of ownership and buy in, involves all sectors of the community, enables integration with*

ongoing activities, provides access to local knowledge and ideas, facilitates consensus, and increases the credibility of the project. Although participatory processes are not uncommon in South Africa, there is sometimes a tendency for project management to become expert-driven and top-down in its approach. The project will actively promote a participatory, gender-sensitive approach." (ID 305)

This points to a considered link of procedural equity as a function of sustainability, whereby project sustainability was said to be brought about through engagement with local communities. Local ownership and sustainability were also mentioned within the idea of including local knowledge, which came up in a few projects (ID 10, 148, 305). Interestingly, the term *local knowledge* was used in reference to sustainability rather than *indigenous* or *traditional knowledge*. For example, again in project ID 305: *"Local knowledge is essential to the efficacy and sustainability of response measures. Without it, projects are expert-driven and often out of touch with realities on the ground, realities that can undermine implementation and sabotage sustainability.* ***A project that incorporates local knowledge meaningfully is more grounded, richer, has a much greater chance of achieving the desired outcomes and impacts, and is more sustainable****."*

As such, the project documentation implied an understanding that without participation and integrated local knowledge in the project design and activities, the project would unlikely be sustainable in the long-term. This suggests that local context has been considered. However, *indigenous,* or *traditional knowledge,* despite being used in the projects was not linked the same way to sustainability in the project document. Instead, it was indicated as important and needed to be integrated with scientific knowledge as described in section 4.3.2 above.

Scalability was referenced in most projects (n_p=11), but the detail of these references varied across the projects. The term *replicable* or *replicability* was used in a number of projects (n_p=9) and most often in describing that project interventions would be able to be used in other regions or districts. The term *continued* and its stems had mixed references and only a few projects referred in some way to project sustainability. The only reference that pertained to social equity was in project ID 178 where the term *continued* was used in relation to community champions. Here it was said that training would be conducted to ensure that these community champions continued to act as the interface between communities and institutional structures. While this links distributional equity to sustainability, there were gaps

on how this training would be distributed, what the recruitment process for community champions looked like, and whether there was fair representation both in this process and in the group of recruits.

While *long-term* is used across all sixteen projects, it was usually in conjunction with *sustainability* and was therefore used in the same ways and contexts. Knowledge capture and lesson sharing was linked to long-term success in project plan justification in project ID 305. In project ID 171, a key quote relating to sustainability thinking for the project was: *"One of the biggest challenges within all development programming* ***is how to ensure that individuals and societies adapt beyond the programme cycle of an intervention*** *(in this case beyond 2018). This is crucial to climate change adaptation because adaptation is a continuous process. People need to acquire the capacity to adapt for generations to come. This project aims to meet immediate needs but also build adaptive capacity for the long-term."* This quote showed consideration for what happens regarding project interventions beyond the project period, and references both *continuous* and *long-term* in terms of how the project was framed.

The term *future* was used in most projects (n_p=14) in some way, but these references varied across the documents. Several projects used the term in reference to the risk of future climate scenarios on project interventions (e.g., ID 113, 116, 19, 345, 420) which spoke to consideration of project sustainability in terms of project intervention success under future climate scenarios. Three projects referenced 'lessons learned' being used in the future (ID 305, 306, 178). Future generations were only mentioned in relation to management objectives or mandates of local forests (ID 345) and funder, national, or international convention policies (ID 178, 364). While future generations were not mentioned in the project planning, there was some consideration of sustainability in terms of language used such as 'in the future' (ID 10), 'going forward,' and 'beyond the project.' While this implied forward thinking beyond the current population, it was not explicit about future generations. There was a general lack of reference to future generations which is an important aspect of distributional equity and sustainability.

Surprisingly, there were few references to an *exit strategy*. Project ID 19 indicated a planned activity for an exit/sustainability strategy to be formulated. Only project ID 171 made further reference to an exit strategy with clearer detail, where: *"Social sustainability: will be ensured*

through the use of the community-based approach to adaptation. ***This will be supported by the formulation of an exit strategy to ensure that project initiatives are mainstreamed into local processes.*** *The exit strategy of the project will be based on five pillars: (1) sensitization and awareness at all levels to promote climate resilient development, (ii) participatory development and monitoring of plans and policies, (iii) community and non-government organisations implementation of activities, (iv) development of vibrant community infrastructure envisaged under the decentralization program and (v) capacitated DAESS [Department of Agricultural Extension Services System] and District Governments."* This plan was linked to social equity through the planned participatory and decentralised approaches.

A challenge to most projects seemed to be how to integrate sustainability into the monitoring and evaluation processes. Most included capacity building (as described under distributional equity) but without explicit mention of project sustainability in the monitoring and evaluation framework itself. One interesting approach taken in ID 171 was the inclusion of an indicator which was said to track the: "*availability of skills and resources necessary to continue adaptation after conclusion of project (indicator for sustainability)."* This was one of the few attempts to track progress with consideration for post-project success. Another relevant example was where ID 420 included a planned indicator capturing the development of a scientific publication on the effectiveness of different sustainable agricultural interventions on delivering climate, social, and ecological outcomes (based on the monitoring and evaluation of project effectiveness). While a number of projects mentioned capturing stories, and even working in conjunction with academic institutes, this was the only clear integration of published work linked to a project.

A final example of sustainability consideration worth noting is in ID 420. Here, under 'operational risk' it was noted that Madagascar ranks 177 out of 189 in the World Bank's Ease of Doing Business Rankings and that it was therefore a difficult place to undertake businesses and that: *"every stage of business development should be expected to be challenging."* As such, challenges to business development were rated as high risk with a high probability of occurrence. The mitigation measures noted were in the funding structures and the timeline. What was interesting is that it was planned as a ten-year project, which was said to support flexibility and 'buffer' for unexpected impacts. This timeline focus was the only mention of a longer time frame contributing to project success because of

acknowledgement of likely setbacks. This again showed ID 420's precautionary approach, which was different to most other projects in the subset where the language used implied a higher success assumption.

4.5 Social equity in safeguard policies across the subset (n_p=16)

Environmental and social safeguards are policies, principles and procedures put in place by funders to identify and mitigate negative impacts from development projects. Safeguard policies were mentioned in thirteen projects with only three projects (ID 1, 10, 113) not mentioning safeguard policies at all. Below I present results for the various ways projects in the subset integrated social safeguards into their project planning documents.

Safeguard policies were linked predominantly to the implementing entities' policies and guidelines, as well as the funder, although the clarity of this varied across the projects. There was also quite varied detail where some projects just listed the policies with no further detail provided (e.g., ID 161) and others had information sporadically addressed throughout the project document (e.g., ID 345). Half of the projects had some mention of a social and environmental assessment or policy (n_p=8).

Project ID 148 had a clear and thorough approach to social safeguards as per the implementing entity's (Conservation International) policies and guidelines. For example, in ID 148, the project clearly stated that through the social and environmental assessment conducted by Conservation International, only three safeguards were triggered: stakeholder engagement, gender mainstreaming, and accountability and grievance mechanism, hence the thorough detail of these three in the project document. The stakeholder engagement plan had been formed which included local communities and local community structures (particularly in the protected area management team) which was said to ensure local participation in management.

The gender management plan, as a result of the gender mainstreaming policy, was said to ensure representation of women across project activities, and their inclusion in management teams (by 20%). It also noted gender-disaggregated indicators in the monitoring and evaluation framework to effectively track whether intended outcomes would be realised. The grievance mechanism was thoroughly described and was said to follow a fair and transparent

approach. One point to note however, is that any issue related to the project that was not associated with Conservation International specifically would not be processed by the mechanism but would be directed to the 'appropriate institution'.

Similarly, social safeguard policy details were extensively described in the environmental and social safeguard document of project ID 420. All entities involved had their own safeguard policies and the project indicated that it adhered to them all. Interestingly, whichever entity had the most stringent policy in a particular context was the one that was followed for the project. The project document detailed each entity's policy and how they were aligned to the project. An extensive document, the environmental and social management plan, clearly outlined: i) socio-economic-cultural context of the project (this was the main place where recognitional equity was demonstrated in terms of local culture and customs); ii) national and regional policy frameworks applicable to the project and how they aligned; iii) the environmental and social impacts, along with mitigation (negative impacts) or enhancement measures (positive impacts); iv) the structure and environmental assessment process of the project (including what needed to be considered in the environmental impact assessments, the administrative process, screening processes (for project activities and sub-projects), and capacity building needs); v) the environmental, and monitoring and surveillance plan (which detailed monitoring and evaluation); vi) stakeholder consultations (which detailed consultation processes in project preparation, the levels of stakeholder consultation and participation in planned project implementation, the grievance mechanism process, a communication strategy and the details on what was termed 'participation in involuntary resettlement'; and vii) the gender mainstreaming and action plan which included extensive detail on gender analysis. This is by far the most extensive detail provided regarding social action plans and how the safeguard policies applied to a project.

In other projects, the safeguard policy processes and how they were integrated into the project design was less clear. For example, in ID 178, the United Nations Environment Programme environment and social safeguard assessment guidelines were followed, and numerous safeguard policies triggered. As per this process, the safeguard advisor advised the following: *"The project team identified economic sustainability a moderate risk. This makes the overall risk of the project in the moderate risk category. It also deals with sensitive biodiversity dynamics. Precautionary, science-based approach using the latest understanding and local traditional knowledge would avoid/minimize the potential risks…**Indigenous***

people will be present near the project sites. Indigenous people and the concerned communities should be involved from the beginning. Implementation approach should respect their tradition, knowledge, and concerns. They should be represented in the stakeholder consultation. There is potential conflict of interest by those who get benefits from Invasive Alien Species*. Invasive Alien Species are often and continuously introduced by some who consider them profitable. There is lack of information on impact of Invasive Alien Species on biodiversity and the economies of Malawi. As it may be for profits for some while majority of community may suffer, economic dynamics,* ***justice and equity should be factored in the project approach for the long-term sustainability of the project outcomes****."*

While these recommendations referred to procedural (in term of representation in stakeholder consultation), distributional (in terms of benefits and disbenefits), and recognitional (in terms of inclusion of traditional knowledge) equity, it was unclear where and how this feedback had been actively addressed and whether it had been integrated into project planning. Therefore, while safeguard processes in this case highlighted areas of concern, there was no indication that these had helped shape project design and implementation.

Chapter Five: Discussion

5.1 Introduction

This research is novel in that it explores social equity, sustainability, and the potential linkages in a sample of Nature-based solution (NbS) projects specifically in Southern Africa, where there has been little work done on the subject. The results show that social equity and sustainability considerations in NbS project planning vary greatly in aspect and depth.

While distributional and procedural aspects of equity tended to be acknowledged in some way, there was often a lack of explanation of how exactly this would be addressed in the project design. Recognitional equity was the least considered overall. Project sustainability (in terms of longevity beyond the funding period) was generally pegged to capacity building and participation within the project rationale and, as such, projects somewhat linked equity to project sustainability. However, it was not always clear how this participation would be facilitated or whether the most vulnerable or marginalised groups would be ensured to be involved. Generally, there was a lack of consideration for how projects would meet multiple, at times conflicting, sustainable development objectives and social equity was not thoroughly linked to the process of achieving sustainable development. Vulnerable groups were rarely differentiated at project sites. While all projects certainly showed a strong social component, this did not necessarily equate to an equitable approach.

In the following section I further outline and unpack key findings that emerged through this research according to my two main research objectives which were to investigate whether and how: i) multiple equity dimensions (including procedural, recognitional, and distributional equity dimensions) are included in NbS design and planning; and
ii) NbS project design and planning makes links between social equity and project sustainability (in terms of project longevity beyond the project funding period and more broadly in terms of sustainable development).

5.2 Recognitional equity consideration in NbS design and planning: Cultural constraints to achieving equity in NbS

There were several instances revealed in the results where local cultural beliefs clashed with project objectives (e.g., ID 116, 345, 420). This raises a complex issue of spatio-temporal benefits and disbenefits, layered with tensions around cultural norms and practices. The

example of ‘tavy’ detailed in the results highlights this complexity. Where practices of slash-and-burn reap short-term economic and cultural benefits for local communities, long-term environmental degradation and reduced carbon sequestration potential are at risk. However, what does this mean from an equity perspective? For example, when considering local costs that are felt for global climate change mitigation benefits and to satisfy environmental-related existence values (Davidson, M, 2013). NbS projects in developing nations could be seen as expecting local communities to sacrifice their own lifestyles for the benefits of local lifestyles in wealthier nations. This echoes the concept around NbS trade-offs (Cohen-Shacham et al., 2019). Considering conflicting cultural aspects as an equity constraint in NbS needs to be a key part of the NbS project process. This is undoubtedly a complex and nuanced constraint to achieving equitable NbS that needs to be interrogated in project design (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep). This further echoes calls to really deliberate together with local communities in planned project sites over project design (Eriksen et al., 2021).

Another constraint to equity in NbS is where certain cultural aspects are normatively understood to be inequitable in areas where NbS projects are set to be implemented. For example, where women are considered minors in customary law as described in 4.3.2 above. Without fully integrating this complexity into NbS design and implementation, social equity processes and outcomes may be compromised (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep). This is further explored in discussing local-level power dynamics in 5.3.2 below.

5.3 Procedural equity consideration in NbS design and planning

5.3.1 Participation of local communities

While the results showed that *participation, engagement,* and *consultation* were frequently referenced words throughout the project documentation, it was not always exactly clear how this would be carried out or who exactly from the local community was involved in each context. Furthermore, the language around the use of ‘stakeholders’ was not always explicit regarding local communities and vulnerable groups, and it was therefore difficult to determine whether these groups were always included in the stakeholder consultations. ‘Participatory processes’ or ‘extensive stakeholder consultation’ were often the extent of the

description which does not clarify who participated, who was consulted, and how those included in these processes shaped project direction.

Interestingly, community-based natural resource management (CBNRM) (n_p=6) and community-based adaptation (n_p=4) were prevalent across the projects reviewed and participation should be a defining feature of community-based initiatives (Blaikie, 2006, Dyer et al., 2014). However, it has been shown in the literature that community-based interventions do not always equate with effective and full participation of local communities, and are often prone to elite capture (Blaikie, 2006, Hebinck, Kiaka & Lubilo, 2019, Muzirambi, Musavengane & Mearns, 2019, Trogrlic et al., 2022). This is concerning as if project design and planning does not fully respond to local-level power dynamics, it is likely that vulnerable and marginalised groups will continue to be excluded (Eriksen et al., 2021). Without fully understanding the drivers of vulnerability and marginalisation within a community and how these shape local dynamics, efforts to promote participatory processes may continue to marginalise the very people the project is said to benefit.

Taylor et al. (2022) argues that those most impacted by a project (in their context, climate adaptation projects) need to be the most included in the co-production of project-related knowledge. The same could be applied to NbS where those most impacted by project interventions should be the ones actively participating in project design and implementation. WWF notes that efforts for stakeholder collaboration in conservation initiatives must, among other things: i) create a safe space for open and transparent dialogue; ii) secure long-term commitment from stakeholders; iii) be aware of power hierarchies within stakeholder groups; and iv) be met in the spirit of learning from each other (WWF, 2000). This is reiterated by Taylor et al. (2022) who describe adaptation as a process of 'continual dialogue and reassessment.' Collaboration does not imply that there will not be conflict, but rather that this will be anticipated and addressed within a collaborative framework (WWF, 2000). This speaks to procedural equity considerations in the negotiation and decision-making processes of project design and implementation, particularly decisions around trade-offs where there are most likely to be differing viewpoints and objectives across stakeholders. How trade-offs in NbS design are negotiated with stakeholders can have a marked impact on equity outcomes and explicit procedural equity considerations should be included in these processes.

Viewing collaboration across a continuum is a way to frame the degree of procedural equity in a project. WWF presents a collaboration continuum which ranges from consultation with stakeholders to transferring project responsibility completely (Figure 18). As you move from left to right, contribution, commitment, and accountability of stakeholders increases, participation in learning processes increases, as do stakeholder expectations (WWF, 2000). Framing vulnerable groups across such a continuum could foster procedural equity in NbS design and implementation if projects attempt to shift towards the right end of the scale.

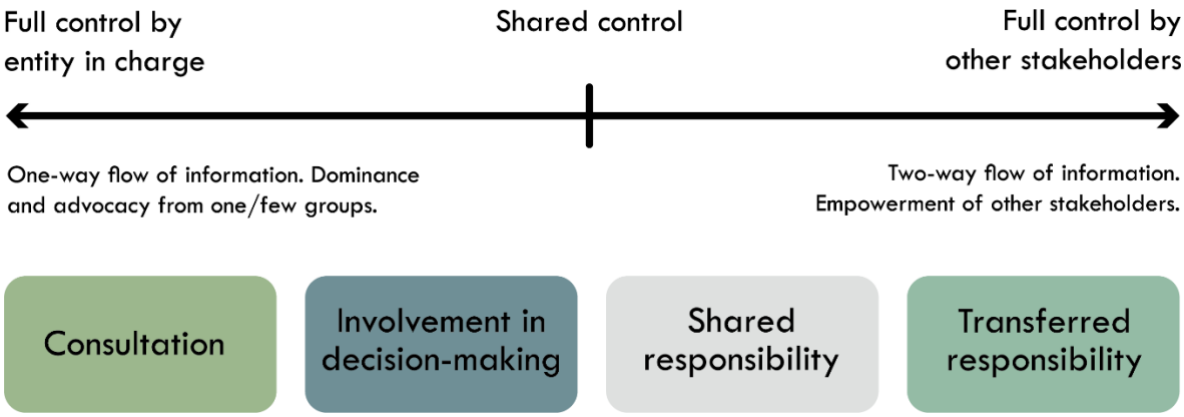

Figure 18: Stakeholder collaboration continuum as a way to frame degree of procedural equity in NbS projects. Adapted from WWF (2000)

These iterative processes are recognised to take more time (Taylor, M et al., 2022) and thus require longer project time frames. Only one project reviewed in this study made specific note of long-term commitment to the project by planning a minimum ten-year time frame with the explicit mention that this was to provide space for flexibility and adaptive management.

5.3.2 Elite capture and power hierarchies

Few projects mentioned elite capture, of which only two of those present participatory processes as a means to overcome it. There was no evidence that projects aimed to comprehensively understand power hierarchies within project areas and how exactly participation would address these. Eriksen et al. (2021), while referring to adaptation interventions in general, explains that even interventions that are specifically aimed to encourage participation can entrench rather than challenge existing power dynamics. This leads to those in positions of power benefiting more from project interventions and exacerbating inequities that create vulnerability in the first place. While some projects

mentioned the importance of power dynamics, there was a general lack of information regarding how these would be addressed. Given the prevalence of community-based approaches in the subset, and the already mentioned high occurrence of elite capture in CBNRM (Blaikie, 2006, Hebinck, Kiaka & Lubilo, 2019, Muzirambi, Musavengane & Mearns, 2019), it is surprising that project documents didn't actively address power dynamics more explicitly even though the majority of projects were developed from 2014 onwards (see Annex 2 for project timelines).

The lack of explicit and comprehensive inclusion of power dynamics and elite capture considerations within the NbS project planning documentation raises questions of whether the participatory processes planned will have meaningful impact for the most vulnerable groups of people. This is further seen in that many projects reviewed built on previous work done through various NGOs or other multilateral funded projects. This is often heralded as a positive aspect of the project. For example, in one of the projects, existing Farmer Field School networks were planned to be used for project interventions which was described as a mechanism to enhance impact. However, there was little information given as to how farmers were selected for the baseline existing programme and the role of social equity in the process. For example, the results showed where a project plan (ID 116) was updated after stakeholder consultations as these consultations revealed that by using the baseline project participants, the most vulnerable community members would be excluded. This shows an example of where stakeholder engagement resulted in a more equitable step in project design.

A lack of investigation of baseline projects or at least thorough detail of this in project documentation raises questions of whether existing power structures are merely reinforced, which is often the case when existing networks are utilized (Eriksen et al., 2021, Taylor, M et al., 2022). Gender norms, livelihoods and power hierarchies within local communities need to be thoroughly understood and factored into NbS intervention design (Roe, D et al., 2021). Furthermore, Taylor et al. (2022) maintains that reflexivity in project institutions themselves (implementing and executing entities and funders) is often lacking yet needed to better understand how power dynamics of project implementors themselves influence and shape power differentials in project design, implementation, and evaluation. Only by openly engaging in this self-reflective process can organisations and institutions begin to address their own position in maladaptation.

5.4 Distributional equity consideration in NbS design and planning: (dis)benefits of NbS projects

While all projects reviewed listed potential risks, only one project attempted to thoroughly unpack the range of potential disbenefits or negative impacts that might occur because of the project and gave mitigation or management options (ID 420). This is in line with using a transformative adaptation approach in project design, which suggests a reflective process whereby fully considering intended and unintended positive and negative impacts from a project becomes central to project design and implementation (Taylor, M et al., 2022). Considering a range of disbenefits in project design is a precautionary approach that acknowledges the nuanced socio-cultural and environmental landscape in which the project is taking place. This is encouraging from an equity perspective, particularly when considering cultural constraints to achieving NbS as described in 5.2.1 above.

For most of the projects reviewed, however, focus was predominantly on the list of benefits that were to be accrued by the project, with a general lack of thorough consideration for potential disbenefits, especially as these may play out at the local level. This finding is in line with the 2020 Global Environment Facility Scientific and Technical Advisory Panel (GEF STAP) report where the lack of identification and recognition of potential disbenefits in project documentation was noted and highlighted as a key challenge to be addressed in future NbS projects (GEF, 2020). Taylor et al. (2022) further notes that downplaying potential trade-offs or disbenefits is common when government backing or external funding is being sought, but that this inevitably prevents the opportunity to learn from project failures.

The need to research, address, and factor in various trade-offs is highlighted across the literature in terms of short-term to long-term benefits (Cohen-Shacham et al., 2016), and social, ecological, and hydrological outcomes of NbS interventions (Chausson et al., 2020). Roe et al. (2021) highlights three key trade-offs that can occur because of NbS: i) trade-offs between nature and development; ii) trade-offs between development outcomes; and iii) trade-offs between local stakeholder groups. Furthermore, Taylor et al. (2022) notes that those most vulnerable or marginalised do not have the voice to bring potential negative impacts forward at the planning stage and therefore tend to bear the greatest cost of unexpected outcomes in adaptation projects. Thoroughly researching and integrating potential trade-offs and disbenefits early into the project design could potentially help NbS projects

overcome some of the recognised challenges inherent in trade-offs related to NbS as highlighted by Roe et al. (2021), including those related to social equity.

Research results were further aligned with the GEF STAP report where it was also acknowledged that across GEF NbS projects, there was a strong focus on environmental benefits with clear detail while local societal benefits were under-represented or poorly described (GEF, 2020). Furthermore, societal benefits are seen as co-benefits as per the GEF mandate and therefore not the main project focus, which is usually on the environment specifically (GEF, 2020). However, as the link between social equity and sustainability becomes clearer (Leach et al., 2018), the importance of understanding societal benefits and disbenefits becomes an integral part of sustainability and therefore requires increased attention to achieve the multiple goals of NbS.

5.5 NbS for whom: Identifying vulnerable groups in project design and planning

There were some attempts by projects to identify vulnerable groups within the project area and these were said to be specifically targeted by project interventions. There was also mention of adaptive management in one project; however, there was a lack of information provided on whether and how this planned to specifically include vulnerable groups into iterative decision-making processes. In most cases, rural communities in planned project sites were described as collectively vulnerable with no distinction to social groupings within these communities. Framing entire groups as vulnerable is problematic as they cannot be seen as a homogenous group – within a community there will be differing drivers of vulnerability and a distinct 'social heterogeneity' in each context (Eriksen et al., 2021). It is recognised that it is usually the poorer or more marginalised groups who disbenefit in comparison to powerful, wealthier groups. This is particularly so in interventions where there is a prerequisite to participate in project activities, such as secure land tenure or infrastructure, or where project implementors are already involved in local-level governance structures (Eriksen et al., 2021, Roe, D et al., 2021). This plays into whether project planning thoroughly investigates socio-cultural, localized dynamics within the planned project site. If not adequately considered, these can present as considerable constraints to achieving social equity in NbS projects (Holden, Hoffman & Shackleton, 2022).

It has been shown that women, particularly in rural areas, are more vulnerable to the impacts of climate change than men (Nhamo, 2014). All sixteen reviewed projects had some form of

gender policy and plan, although only three projects explicitly mentioned hiring gender experts as part of the project team. There were only a few mentions of tangible actions for a 'gender sensitive approach.' One such example is being considerate of project activity timing so as not to conflict with child-rearing responsibilities of women. While gender is certainly included in the project designs of the research subset, whether there was adequate investigation into how gender shapes power dynamics within different contexts was not always clear.

Interestingly, Eriksen et al. (2021) referencing a recent review of the Adaptation Fund found that less than half of the implementing entities, board members, designated authorities, and NGOs thought that policies and programmes sufficiently consider gender (Eriksen et al., 2021). The findings from this thesis highlight this uncertainty of how exactly gender policies are integrated into project design and implementation other than gender-disaggregated indicators seen in the monitoring and evaluation frameworks. Furthermore, as the results show, it is unclear how particular gender target percentages were conceived for various project activities and whether these are even representative of current populations.

Most projects mentioned undertaking a vulnerability assessment, either prior to the project document development, or set in the project plan. While there was information, gathered in some cases from the vulnerability assessments, about how many people were vulnerable (for example exposed to hazards or food insecure), there was little information exploring why, or how these groups were identified or differentiated. Furthermore, broad background socio-political context was often given, usually for the country or region, but did not always clearly explore what was happening at the project site. Without this local context, constraints to achieving social equity cannot be considered and addressed in NbS project design and planning (Holden, Hoffman & Shackleton, 2022).

There are calls for more attention to be paid to the array of inequalities that shape vulnerability and local adaptive capacity in a given context (Taylor, M et al., 2022, Tschakert et al., 2013). This would require social differentiation in the project design to fully understand who is most vulnerable and why. This approach aligns with 'transformative adaptation' (Taylor, M et al., 2022) and while used in relation to climate change adaptation specifically, can be applied more broadly to NbS. Here the goal is to make the adaptation process an ongoing learning opportunity that places identified vulnerable groups at the centre

of the intervention by addressing the root causes of vulnerability (Taylor, M et al., 2022). Furthermore, outcomes of NbS interventions tend to be more positive when directly focused on marginalised groups (Roe, D et al., 2021).

5.6 Equity in monitoring and evaluation frameworks

Monitoring and evaluation frameworks reviewed did not adequately incorporate a multidimensional approach to equity in NbS projects. These frameworks predominantly focused on high-level indicators such as 'number of beneficiaries reached' or 'area restored' or even 'number of workshops implemented.' This quantitative approach is not suitable for measuring the impact of the NbS project on social equity. For example, 'number of workshops implemented' does not reveal whether the workshops had equitable representation, whether they were well attended or well received, whether participants felt like they gained valuable insight, or whether participants felt like they could share insights in an equitable manner.

There were some attempts to capture more nuanced details in monitoring and evaluation structures, such as 'number of case studies' or 'number of people who feel equipped to deal with future climate changes,' or through reflection workshops, household-level surveys, or what is broadly termed 'participatory data collection.' These certainly show a shift to try address some of the challenges of tracking project progress in structured frameworks and align with calls in the literature to include more local-level perspectives into monitoring and evaluation (Seddon et al., 2021). These were few, however. Furthermore, even when these aspects were incorporated in the frameworks, they still did not adequately incorporate a differentiated perspective regarding beneficiaries or whose perspectives would be prioritised.

There seems to be great room for actively incorporating an equitable approach to including local experience into project monitoring, evaluation, and reporting. However, this raises a critical question of what makes a project successful or whose opinion of project success counts. Or what project outcomes deem a project successful or unsuccessful. It is recognised in terms of climate change adaptation that there is no single definition for adaptation success and that its conception will vary depending on different people or groups' perspectives (Dilling et al., 2019) or level of power (Eriksen et al., 2021). Taylor et al. (2022) note that monitoring and evaluation frameworks often focus on narrow criteria that track whether the project plan was well implemented rather than whether it was appropriate in the first place.

This narrow approach prevents the opportunity for greater learning (Taylor, M et al., 2022). A fuller exploration of potential project 'benefits' and 'disbenefits,' 'successes,' and 'failures' through a multidimensional equity lens is needed to move towards more equitable NbS projects going forward, particularly as these relate to NbS equity outcomes across spatial, temporal, and even sectoral scales (Eriksen et al., 2021, GEF, 2020). Furthermore, sharing project successes and failures globally is also key to collaborative learning (Angelstam et al., 2017). Understanding and transparently sharing project equity challenges and setbacks can better shape future NbS projects to be more equitable and sustainable.

The attempts of projects to collect more qualitative data through community surveys and case studies further shows a consideration of the limits of monitoring and evaluation frameworks. It also shows that there is potential to incorporate equity aspects in NbS project monitoring and evaluation as qualitative approaches would be more appropriate for collecting information about multidimensional equity outcomes of NbS (Davidson, D, 2016, Hackmann, Moser & St. Clair, 2014). However, in the current projects it was unclear if and how exactly this qualitative data would be integrated back into future project implementation. Many projects spoke about sharing 'lessons learned,' particularly through planned web-based platforms, but how this can translate into NbS development is not clear. This would also be an issue for any equity indicators if they were to be included.

Only one project attempted to include scientific publications in their project plan. While this kind of project-initiated research is encouraging, it was not specified whether the researchers for these papers were to be from Madagascar itself (the country of project ID 420) or from the Global South at all. There is a lack of peer reviewed studies on NbS from the Global South (Chausson et al., 2020) and Africa only received 3.8% of climate-related research funding globally from 1990 to 2019 (Trisos et al., 2022) . Of the 3,8% funding for Africa mentioned above, only 14.5% was allocated for African institutions, while 78% went to institutions in the Global North to do research on Africa (Trisos et al., 2022). Channelling funding for research through NbS projects by African researchers and institutions could better contribute to NbS development in Africa.

The results of this thesis show that there is a lack of focus on monitoring and evaluation beyond the project funding period, and in general, there is no planned monitoring and evaluation after the project period. As such, long-term outcomes are largely ignored as are

any negative impacts that may have arisen, both directly and indirectly of the project interventions (Eriksen et al., 2021). Furthermore, as future generations are rarely spoken about through project documentation or in their monitoring and evaluation frameworks, consideration of long-term impacts are unclear, especially as to how these may unfold under future climate scenarios (Seddon et al., 2021). This is acknowledged as a key challenge to NbS (GEF, 2020). The temporal aspects of NbS are also difficult to capture in the short-term nature of project-based monitoring and evaluation time frames, as the ecosystem-based benefits accrued may only be reaped in the long-term, long after the project has closed (Seddon et al., 2020). This is concerning from an equity point of view especially if there are costs to vulnerable communities that are not mitigated.

5.7 Social and safeguard policies

Environmental and social safeguard (policies, principles, and procedures put in place to identify and mitigate negative impacts from development projects) screening processes were undertaken for most projects depending on specific funding requirements. However, it was generally difficult to discern how exactly (and if) the various funders' safeguard policies had been integrated into the project design. Dawson et al. (2018) highlight that as safeguard policies are those of funders and implementing entities, there are not always the supporting policies, structures, and capacities at the national and regional level of project interventions to ensure the safeguard policies are implemented. It has been further shown, particularly in the context of REDD+ projects, that safeguards can unfortunately become an administrative burden, and thus reduced to 'tick-box reporting' rather than being an actual force for environmental and social good (Dawson et al., 2018, Roe, S et al., 2013).

5.8 Social equity and contribution to sustainability

5.8.1 Social equity and links to project longevity

There were some links between project sustainability and social equity presented in the results, particularly around capacity building and participation of local communities. This mainly pertained to procedural equity through participation. However, the gaps in equity inclusion shown in 5.3.1 around participation are significant in terms of project sustainability. As described in the introduction, only sustainable NbS projects that persist longer than their funding periods will be able to contribute meaningfully to sustainable development (i.e. if they are no longer around they cannot contribute), and for those to be sustainable both in

terms of longevity and in terms of contributing to sustainable development during their funding periods and beyond, they need to incorporate multidimensional aspects of equity (Holden, Hoffman & Shackleton, 2022, Holden et al., in prep). Ultimately, local-level agreement, acceptance, and ownership of project interventions is required for projects to persist beyond the funding period (Roe, D et al., 2021).

5.8.2 Social equity and links to sustainable development

In terms of broader contribution to sustainable development, while I found all projects to align in some way to the Sustainable Development Goals (SDGs) (particularly to goals #5 (Gender Equality), #13 (Climate Action), #1 (No Poverty), #2 (Zero Hunger), and #15 (Life on Land)), there was little evidence recognising the complexity inherent in working towards multiple, at times conflicting, SDGs when considering achieving equity in local contexts. For example, there was strong focus on sustainable natural resource management for biodiversity protection and securing ecosystem services (i.e., #15 Life on Land). However, it was not made clear whether sustainable harvesting rates would meet the needs of people relying on those resources. While there was some mention of compensation, there was little detail across the projects of what processes would be undertaken to manage equitable distribution of compensation, who would qualify for access to natural resources, and how this would be carried out.

While limiting harvesting of natural resources (forests, for example) would arguably be good for goal #13 (Climate Action) and #15 (Life on Land), what exactly that would mean for goals #1(No Poverty) and #2 (Zero Hunger) across various social groups within the community who rely on these resources in different ways was not explored. The assumption is that sustainably harvested forests would continue to provide resources over the long-term, which may be true, but this does not adequately explore what this means in the short-term for communities reliant on those resources. This raises several questions: How much is sustainable? What harvesting techniques are to be used? Does sustainable harvesting mean harvest less? Who decides this? and who within the community gets access to these resources and who does not?

The multi-focused nature of the SDGs provides an opportunity to interrogate the complexity inherent in socio-ecological systems (Tschakert et al., 2013) in which NbS operate. However, this requires real deliberation around the tensions and trade-offs this exposes. It is here that

there are calls for co-production in project planning and design that transcends merely gathering local insights, to having local communities actively decide on project direction (Eriksen et al., 2021, Taylor, M et al., 2022). While part of the appeal of NbS is that it can benefit both people and nature, deeper interrogation of what this looks like on the ground in project planning could show more clearly whether and how tensions could be resolved.

Chapter Six: Conclusion

6.1 Introduction

Nature-based Solutions (NbS) undoubtedly have the potential to provide an array of benefits for biodiversity, the environment, and society. However, as discussed, there are limitations and constraints that need to be thoroughly considered in their design and implementation (Cohen-Shacham et al., 2019, Roe, D et al., 2021, Seddon et al., 2020). It is recognized in the literature that NbS are context specific and need to be designed as such (Holden, Hoffman & Shackleton, 2022, Roe, D et al., 2021, Seddon et al., 2021). The following points would further assist context relevant NbS design and planning.

6.2 Key messages for NbS transformation

6.2.1 Social equity aspects in NbS design

The results showed varied incorporation of all three aspects of equity – distributional, recognitional, and procedural. Within distributional equity, there was a gap in exploring potential disbenefits a project might bring about, especially as these pertain to vulnerable groups and future generations. Procedural equity was mainly addressed through planned 'participatory processes,' yet often lacked detail as to how these processes would be facilitated, and how these would inform decision-making. Recognitional equity was the least considered, with the most significant aspect being the mention of traditional/indigenous and local knowledge, but there were gaps in terms of how these knowledge systems would be integrated into project plans. Using the equity framework shown in this research (Bennett, 2020, Holden, Hoffman & Shackleton, 2022) in the design and planning of NbS could aid transformation and facilitate sustainability in NbS. By ensuring that all aspects of equity are thoroughly considered in NbS design and implementation, trade-offs and tensions could be more thoroughly anticipated and mitigated and thus sustainability better supported (Leach et al., 2018).

Taylor et al. (2022) argue that key aspects of transformative adaptation (Box 2) should be evident in project proposals for them to even be considered by funders. This requires transformation in funding institutions themselves – where deeper consideration of how power shapes project interventions, what constitutes as project success and by whom – is needed (Taylor, M et al., 2022). Given the link between social equity and sustainability in

NbS, a similar framing could be used whereby the three dimensions of equity are included as mandatory in project proposal, design, and implementation.

Box 2: Five key elements for transformative adaptation
1. Make rights and justice the target of adaptation
2. Acknowledge power relations
3. Embrace knowledge pluralism
4. Foster bottom-up coalitions to strengthen local sources of adaptation
5. Recognise risks, trade-offs, and unexpected outcomes
(Taylor, M et al., 2022)

6.2.2 Traditional/indigenous knowledge inclusion in NbS

While mention was made of traditional and/or indigenous knowledge across the subset, particularly that it needed to be integrated with scientific knowledge, there was little detail as to how it would be acknowledged and included in project design. It has been highlighted that there are deep complexities in trying to find understanding between 'scientific' and 'traditional' knowledges as western-based science alone may be inadequate to interpret traditional or indigenous knowledge (Nakashima, Rubis & Krupnik, 2018). To overcome this, transdisciplinary approaches are needed – an example given by Nakashima, Rubis & Krupnik (2018) is where a western-based understanding of the traditional knowledge systems of Andean farmers was only found through transdisciplinary research involving an anthropologist, meteorologist, and a climatologist. Taylor et al. (2022) maintain that traditional/indigenous knowledge should be incorporated into the framing of problems right from the beginning rather than these knowledge systems needing to be validated by scientific knowledge, where they often run the risk of becoming 'subordinate' or 'supplemental' to western-based knowledge systems.

In the context of NbS, perhaps a shift is needed in what kinds of teams are put together to work on project design and implementation. A transdisciplinary team including both the biophysical and social sciences (Cockburn et al., 2018, Nakashima, Rubis & Krupnik, 2018) that is willing to co-create and grapple along with local communities in search of project pathways (Eriksen et al., 2021) would better support mutual understanding, particularly in situations where there are opposing opinions or beliefs (Cockburn et al., 2018). Cockburn et al. (2018) describe this as breaking through limitations of one knowledge system through a

process of ‘generative tension’ or ‘dialectic’ so that multiple disciplines and knowledges can iteratively build new ways of understanding in complex socio-ecological systems. Taylor et al. (2022) speak of this co-creation of knowledge needing to respect differing epistemological bases with the understanding that there will often be misalignment in perspectives. This approach suggests transformation through process, which echoes the need for an emphasis on social equity as a process in addition to an outcome (Holden, Hoffman & Shackleton, 2022).

Finally, in the effort of co-creation or co-production of knowledge, it is important to acknowledge who is involved in this process. Taylor et al. (2022) suggest that this process can be as important as the output of co-produced knowledge because the act of knowledge gathering requires creating an environment which is mindful of who is included and whether the process is itself inclusive. This is an important part of building trust and long-term partnerships (Taylor, M et al., 2022). As such, the process of knowledge co-production must explicitly incorporate aspects of recognitional and procedural equity.

6.2.3 Beyond monitoring and evaluation frameworks

There are undoubtedly challenges to effective and meaningful monitoring and evaluation. It is clear, however, that there is a need for monitoring and evaluation frameworks to include indicators defined by and of relevance to local communities themselves (Dilling et al., 2019). Explicit mention of data collection methods would also make clearer how a more qualitative approach could be imagined to support appropriate indicators for capturing the multiple dimensions of equity. For example, methods such as storytelling, participatory video, and photovoice could help measure local perceptions of NbS progress (Dilling et al., 2019).

The plan for the Participatory, Monitoring, Evaluation, Reflection and Learning system (PMERL) in project ID 171 could provide a way forward in this regard. Here, indicators are said to be decided in consultation with local communities at project inception. It is also suggested to include reflection for ‘transformative social learning’ beyond the formal boundaries of the project. An example given is creating space for fun reflection, such as a social activity where project actors can come together and better understand each other’s shared values (Cockburn et al., 2018). Taylor et al. (2022) support the idea that a safe space for reflective learning within project institutions (i.e. implementing and executing entities and funders) is needed to reimagine how, in this case, climate change adaptation projects are designed and implemented. They maintain for transformative adaptation a greater focus needs

to be placed on what is not known and what is out of project implementors' control, thus shifting or attempting to 'level' power hierarchies. In other words, this allows project designers and implementors to more compassionately engage with the target beneficiaries of planned projects (Taylor, M et al., 2022). There is limited literature on case studies of PMERL, particularly in Southern Africa and further research on its efficacy is needed.

6.3 Final remarks

This research set out to explore social equity and sustainability considerations in the design and planning of multilateral NbS projects in Southern Africa, in terms of whether and how a multidimensional approach to equity was considered in NbS projects, how sustainability was incorporated, and whether interlinkages between equity and sustainability were evident. To achieve this, I identified and characterised all relevant NbS projects in the region in terms of country focus, NbS type, and targeted societal challenge. I then explored a subset of these projects in terms of social equity and sustainability considerations.

What I found is that NbS projects in Southern Africa tended to: i) integrate multiple forms of NbS types into one project (e.g. combining protection, restoration and sustainable management into one project as opposed to focusing on just one NbS type); ii) be cross-cutting in their societal focus; iii) mostly consider distributional and procedural equity yet generally lack clear detail showing how these considerations will be supported; iv) generally exclude recognitional equity – particularly details of the inclusion of traditional and indigenous knowledge; v) somewhat link project sustainability (in terms of project longevity) to social equity through mention of capacity building and participation in project design, but that gaps existed, particularly in relation to the processes of participation; vi) under-represent the need for equity in NbS design, planning, and implementation to achieve sustainability in terms of sustainable development (as defined by the Sustainable Development Goals); and vii) not recognise the complexity inherent in working towards multiple, at times conflicting, SDGs when considering achieving equity in local contexts.

Therefore, based on these findings it is suggested that to achieve active inclusion of multiple social equity aspects in NbS design to support project sustainability (both in terms of longevity and in terms of achieving the SDGs in an equitable manner) the following is required:

i) long-term and deliberate engagement to co-create NbS interventions with local communities, especially when local practices conflict with imagined sustainable development objectives
ii) an understanding of context specific, local-level power hierarchies, social heterogeneity, and drivers of vulnerability which are crucial to avoid maladaptive interventions and should be worked into NbS project design
iii) transdisciplinarity in NbS design and implementation which can help foster long-term transformation
iv) an understanding that what counts as NbS 'success' will differ across actors and multiple indicators that reflect the broad range of project stakeholders, and their perceptions should be incorporated into the monitoring and evaluation framework, including the consideration of future generations.

Finally, it is important to acknowledge that social equity within NbS is an organic process rather than a static state and requires continuous consideration and engagement throughout both NbS project design and implementation.

6.3.1 Study limitations

The randomly selected subset of sixteen projects was too small a sample size to capture all funders and countries, especially countries and funders that had very small representation in the broader database of 134 projects. As such, the focus was placed on having the main funders included in the subset (the stopping criteria for the random selection) as the funders have a greater impact on how equity is addressed in project design rather than the country focus. However, a larger sample size for the qualitative analysis would have provided better geographical representation.

The research question focused on social equity and sustainability considerations in NbS project design. This is an important first step to understand equity dimensions in NbS. However, this research cannot assess whether these projects were successful in implementing these equity dimensions. Further research into project implementation would be required.

6.3.2 Recommendation for further research

Project implementation review was outside the scope of this research but would be an important follow-up to better understand how social equity and sustainability considerations

translate to project implementation on the ground. This would require further project document review (mid-term evaluations and final document reviews), interviews, focus groups, and site visits with project implementors, project beneficiaries, and local community members. Similarly, an environmental and social safeguard, and gender policy review was also outside the scope of this research. This would require policy document review and interviews with policy advisors and project implementors.

ANNEXES

Annex 1: Broad NbS categories – full descriptions

Broad NbS categories
Protection: Interventions involving a "clearly defined geographical area through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, 2008). This can involve land site specific protection, including protected areas and their management, private land conservation measures, reserves, or conservancies, areas protected by Indigenous Peoples and local communities (e.g., sacred sites), or locally managed terrestrial areas with specific set-aside 'conservation zones'. Can involve protecting a natural or created habitat. *Restoration*: Active or passive interventions that involve returning degraded, damaged, or destroyed ecosystems to a pre-disturbance natural state, including their structure or function. Also includes the restoration of natural (or wild) resources such as reintroduction or species but excludes agrobiodiversity restoration which falls under the Sustainable Management. 'Restoration' can be synonymous with reclamation, reforestation, rehabilitation, revegetation, and reconstruction. Restoration can also be referred to as ecological, functional, habitat, or structural. *Sustainable Management*: A mix of Seddon et al 2021's 'Harness and Manage' categories. These include interventions that make use of ecosystem functions and services (such as nutrient cycling, soil formation, water infiltration, pollination, natural pest control) to maintain or enhance food production and other activities not related to food production. Food production examples include agroforestry, conservation agriculture, permaculture activities, silvopasture, ecosystem-based fisheries and enhancing crop diversity using traditional crop varieties. Excludes industrial agriculture which relies on chemical inputs and/or depletes biodiversity. Non-food production examples include forestry or forest management (e.g., for timber, for non-timber forest products or for producing other ecosystem goods and services), species management (for example for hunting, tourism, trade, or conservation). Can involve managing natural or created habitat. *Creation*: Interventions that establish novel ecosystems. These include creating a new habitat type in place of the naturally occurring one (e.g., afforestation of former grasslands, created wetlands, mangrove plantations and shelterbelts) or where the habitat is modified such that it does not resemble its natural ecological state (e.g., rehabilitating degraded land with exotic species or reforesting an area with a single species where it should be a diverse forest). Created agroecosystems are excluded as these are included under the category of sustainable management. In many cases these interventions occur in cities and near cities but can also be implemented across the broader landscape.
(Holden, Hoffman & Shackleton, 2022, Holden et al., in prep, Roe, D et al., 2021, Seddon et al., 2021)

Annex 2: Projects in the database subset

Database subset of 16 projects with unique identifier					
UID	**Project Name**	**Country**	**Funder**	**NbS Category**	**Project timeline**
1	Integrating Climate Change into Environment and Sustainable Land Management Practices (ICE-SLM)	Angola	Least Developed Countries Fund	Restoration, Sustainable Management	2016-ongoing
170	Shire Natural Ecosystems Management Project	Malawi	Least Developed Countries Fund	Protection, Sustainable Management	2012-2019
10	Integrating Climate Resilience into Agricultural and Agropastoral Production Systems through Soil Fertility Management in Key Productive and Vulnerable Areas Using the Farmers Field School Approach	Angola	Least Developed Countries Fund	Sustainable Management	2016-ongoing
113	Strengthening Capacity for Climate Change Adaptation through Support to Integrated Watershed Management Programme in Lesotho	Lesotho	Least Developed Countries Fund	Sustainable Management	2015-ongoing
401	Development, Empowerment and Conservation in the Greater St Lucia Wetland Park and Surrounding Region	South Africa	GEF Trust Fund	Restoration, Protection, Sustainable Management	2009-2018
161	Mulanje Mountain Biodiversity Conservation Project	Malawi	GEF Trust Fund	Restoration, Protection, Sustainable Management	1999-2009
19	Sustainable Land Management in Target Landscapes in Angola's Southwestern Region	Angola	GEF Trust Fund	Restoration, Sustainable Management	2020-ongoing
305	Building Resilience in the Greater uMngeni Catchment	South Africa	Adaptation Fund	Restoration, Sustainable Management	2014-ongoing

345	Promoting Climate Resilient Community-based Regeneration of Indigenous Forests in Zambia's Central Province	Zambia	Least Developed Countries Fund	Restoration, Sustainable Management	2015-ongoing
171	Climate Proofing Local Development Gains in Rural and Urban Areas of Machinga and Mangochi Districts	Malawi	Least Developed Countries Fund	Restoration, Sustainable Management, Creation	2014-ongoing
148	Conservation and Sustainable Use of Biological Diversity in the Northwestern Landscape (Boeny region)	Madagascar	GEF Trust Fund	Restoration, Protection, Sustainable Management	2019-ongoing
116	Adaptation of Small-scale Agriculture (LASAP)	Lesotho	Least Developed Countries Fund	Sustainable Management	2014-ongoing
178	Enhancing Sustainability of Protected Area Systems and Stabilizing Agro-production in Adjoining Areas through Improved IAS Management	Malawi	GEF Trust Fund	Restoration, Protection, Sustainable Management	2018-ongoing
306	Taking Adaptation to the Ground: A Small Grants Facility for Enabling Local Level Responses to Climate Change	South Africa	Adaptation Fund	Sustainable Management	2014-ongoing
364	Strengthening Institutions, Information Management and Monitoring to Reduce the Rate of Illegal Wildlife Trade in South Africa	South Africa	GEF Trust Fund	Protection	2018-ongoing
420	Sustainable Landscapes in Eastern Madagascar	Madagascar	Green Climate Fund	Restoration, Protection, Sustainable Management	2016-ongoing

Annex 3: Multilateral fund descriptions in the subset

Adaptation Fund

The Adaptation Fund is a financial mechanism under the UNFCCC and the associated Kyoto Protocol set up in 2011 to finance adaptation projects and programmes in developing countries. Funding streams come from developed country donations and a share of proceeds from the Clean Development Mechanism (CDM). This fund predominantly focuses on climate change adaption in food security, agriculture, water management, and disaster risk reduction. The financing instruments are administered through grants, either through international or direct access (through national Implementing Entities). It has its own Environmental and Social Policy and Gender Policy and Action Plan. Financial contributions as of November 2020 amount to US$1.05 billion (CFU, 2019c).

Least Developed Countries Fund

Established in 2001 at the 7th Conference of the Parties (COP7), the LDCF focuses on climate change adaptation in the least developed countries. This involves activity in a variety of sectors including water, agriculture, food security, health, disaster risk reduction and prevention, infrastructure, and fragile ecosystems. It is administered by the Global Environment Facility (GEF) as a special trust fund. All projects funded by LDCF under GEF must adhere to GEF Environmental and Social Safeguard Policy and GEF Policy on Gender Equality. The overall pledge to the fund was US$1.6 billion as of November 2020 (CFU, 2019a).

GEF Trust Fund under the Global Environment Facility (GEF)

The GEF was established in 1992 at the Rio Earth Summit to support the environment and sustainable development. It supports the implementation of several multilateral environmental agreements and acts as one of the financial mechanisms for the UNFCCC and the Paris Agreement. GEF administers the GEF Trust Fund as well as numerous other funds including the Least Developed Countries Fund and the Special Climate Change Fund. The GEF has had 7 replenishment periods, with the cumulative contributions for the 7th replenishment period (2018-2022) amounting to US$4.1 billion (CFU, 2019b). To date GEF has facilitated more than US$21.7 billion in grants and amounted US$119 billion in co-finance (GEF, 2022). The GEF focuses on a wide variety of topics, of which the main ones

include; climate change, biodiversity, international waters, food security, land degradation, sustainable forest management, chemicals and waters, and sustainable cities (GEF, 2022).

Green Climate Fund

The Green Climate Fund was established in 2010 under the UNFCCC and aims to contribute towards the goals set out in the Paris Agreement for mitigation and adaptation. It is currently the world's largest multilateral climate specific fund. The Initial Resource Mobilisation (IRM) period pledge amounted to US$10.3 billion from contributions of 45 countries, 3 regions and 1 city. The first replenishment period has amounted to US$10 billion from 30 countries and 1 region. The GCF has a baseline of 50% adaptation allocation ear-marked for vulnerable countries (Least Developed Countries (LDCs), Small Developing Island States (SIDS) and African countries). GCF supports both direct access and international access funding through accredited entities. It has a specified Environment and Social Policy under the GCF Environmental and Social Management Plan, which also includes a Gender Policy and a formal Indigenous Peoples Policy (CFU, 2019d).

Annex 4: Project questionnaire

#	Question	Options (where applicable)	Question Type
Section One - Metadata			
1	TES NbS Project Name		short answer
2	TES NbS Project UID		short answer
3	Which project documents were available and used for this study?	*Project information form (or similar), Project Document, Approved Funding Proposal (or similar), CEO Endorsement, Other*	checkboxes
4	Does the project focus on one broad type of NbS or a combination of broad types of NbS (broad types listed in question 5)?	*Focal, Combination*	multiple choice
5	What broad types of NbS interventions are considered in the project?	*Restoration, Protection, Sustainable Management, Creation, Other*	checkboxes
6	Do the NbS intervention/s target one or various types of ecosystems (see ecosystem types in question 7)?	*One, Combination*	multiple choice
7	Within which broad ecosystem type is the project being conducted?	*Natural/semi-natural, Working lands, Novel, Other*	checkboxes
8	Within which ecosystem type did the project documentation describe the project to be conducted in?	*Forests, Woodlands, Shrublands, Grasslands, Savannas, Deserts and semi-deserts, Wetlands, Plantations, Croplands, Sown or semi-natural rangelands, Floodplains, Unsure, Other*	checkboxes
9	Tick all that apply to the project as per the project documentation for more detail on the type of NbS intervention/s planned for the project	*Agroforestry, Conservation agriculture, Sustainable forest management, Sustainable land management, Public protected areas, Private protected areas, Restoration, Sustainable ecosystem management, Sustainable natural resource management, Community protected areas, Public-private protected areas (including stewardship agreements), Sustainable rangeland management, Reforestation, Afforestation, Sustainable agriculture intensification, Public-community protected areas, Transboundary protected areas, Other*	checkboxes
10	Do the project documents use policy relevant terminology to describe the NbS intervention (See policy-relevant terms in Q:11)?	*Yes, no*	multiple choice
11	If yes, what policy relevant terminology is used in the project documentation?	*Nature-based solutions, Natural climate solutions, Ecosystem-based adaptation, Community-based adaptation* *Ecosystem-based disaster risk reduction, Climate adaptation services, Ecosystem-based mitigation, Forest landscape restoration, REDD+, Payment for ecosystem services, Community-based payment for ecosystem*	checkboxes

		services, Ecological infrastructure, Community-based natural resource management, Community-based conservation, Other	
12	What sector/s does the project focus on?	*Agriculture, Forestry, Energy, Conservation, Human health, Water, Disaster risk reduction, Socio-economic development, Tourism, Other*	checkboxes
13	What was the targeted societal focus of the NbS project?	*Food security, Water security, Energy security, Human health, Climate change adaptation, Climate change mitigation, Disaster risk reduction, Local socio-economic development, Biodiversity loss, Conservation broadly, Poverty, Sustainable livelihoods, Other*	checkboxes
14	Does the project documentation note alignment with any of the following?	*United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (CBD), United Nations Convention to Combat Desertification, Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention for the Safeguarding of the Intangible Cultural Heritage, Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Other*	checkboxes
15	Does the project align with any of the SDGs?	*Yes, no*	multiple choice
16	If yes, which SDG/s?	*1. No Poverty, 2. Zero hunger, 3. Good health & well-being, 4. Quality education, 5. Gender equality, 6. Clean water & sanitation, 7. Affordable & clean energy, 8. Decent work & economic growth, 9. Industry, innovation & infrastructure, 10. Reduced inequalities, 11. Sustainable cities & communities, 12. Responsible consumption & production, 13. Climate action, 14. Life below water, 15. Life on land, 16. Peace, justice & strong institutions, 17. Partnerships for the goals, N/A*	checkboxes
17	Who was the funder?	*GEF Trust Fund, Least Developed Countries Fund, Multi Trust Fund, Special Climate Change Fund, Adaptation Fund, BioCarbon Fund, Global Climate Change Alliance, Green Climate Fund, Adaptation for Smallholder Agriculture Programme, UN Agency for International Development, and the UN-REDD Programme*	multiple choice
18	What is the project status?	*Project Approved, Concept Approved, Completed*	multiple choice
19	What is the project type?	*Full-sized Project, Medium-sized Project, Enabling Activity, Program, Other*	multiple choice
20	What is the project timeline		short answer
21	Who is listed as the project Implementing Entity?		short answer
22	Who is listed as the project Executing Entity?		short answer
23	Was the funding done through a direct access mechanism?	*Yes, no*	multiple choice
24	How much was the project grant?		short answer
25	How much was the co-financing?		short answer
26	Which country was the project in?	*South Africa, Namibia, Botswana, Zimbabwe, Mozambique, Zambia, Malawi, Eswatini, Angola, Lesotho, Madagascar*	multiple choice

27	Please provide the google link to the project documents		short answer
Section Two: Social equity considerations			
28	Does the project include any aspects of equity?	*Yes, no*	multiple choice
29	Were any of the following words, pertaining to distributional equity, used in the project documentation with regard to local communities?	*Income, remuneration, wages, economic opportunity, livelihood, benefits, disbenefits, fairness, capacity building, education, training, equity, equitable, wellbeing, health, security, welfare, impact, beneficiaries, gender, distribution*	checkboxes
30	Through qualitative narrative, analyse the text coded for the word searches and write up findings pertaining to distributional equity		long answer (open ended)
31	Were any of the following words, pertaining to recognitional equity, used in the project documentation with regard to local communities?	*Rights, culture, tradition, traditional, heritage, knowledge, indigenous knowledge, representation, identity, values and vision, practices, respect, recognition*	checkboxes
32	Through qualitative narrative, analyse the text coded for the word searches and write up findings pertaining to recognitional equity		long answer (open ended)
33	Were any of the following words, pertaining to procedural equity, used in the project documentation with regard to local communities?	*Consent, transparency, consultation, participation, participatory, engagement, collaboration, joint decision making, trust, informed, involvement, free, prior informed consent, grievance mechanism, dispute, conflict, resolution, voice, codesign, coproduction, elite capture, power, dynamics*	checkboxes
34	Through qualitative narrative, analyse the text coded for the word searches and write up findings pertaining to procedural equity		long answer (open ended)
35	Which aspects of equity and to what extent, does the project documentation consider the following:	*Distributional Equity, Recognitional Equity, Procedural Equity:* *1) not considered at all, 2) considered only, 3) considered with marginal detail of how this is addressed, 4) considered thoroughly with clear details of how this is addressed*	multiple choice grid
36	Briefly explain the overarching consideration of these types of equity within the project document. (i.e. why did you tick the chosen options in the previous question)		long answer (open ended)
37	Were potential benefits or burdens for different current local communities	*Benefits, Burdens:*	multiple choice grid

	considered in the project planning documentation?	*1) not mentioned at all, 2) mentioned only, 3) mentioned with marginal detail to support positive and mitigate negative outcomes, 4) mentioned thoroughly with clear detail to support positive, and mitigate negative outcomes*	
38	Were potential benefits or burdens for future generations of local communities considered in the project planning documentation?	*Benefits, Burdens:* *1) not mentioned at all, 2) mentioned only, 3) mentioned with marginal detail to support positive and mitigate negative outcomes, 4) mentioned thoroughly with clear detail to support positive, and mitigate negative outcomes*	multiple choice grid
39	Were potential benefits or burdens for vulnerable people/groups within local communities considered in the project planning documentation?	*Benefits, Burdens:* *1) not mentioned at all, 2) mentioned only, 3) mentioned with marginal detail to support positive and mitigate negative outcomes, 4) mentioned thoroughly with clear detail to support positive, and mitigate negative outcomes*	multiple choice grid
40	Qualitatively expand on the previous three questions regarding benefits and burdens for local communities in the project documentation		long answer (open ended)
41	Does the project document specify who are believed to be the most vulnerable groups/individuals/communities?	*Yes, no*	multiple choice
42	If yes to the previous question, tick all that apply	*Men, Women, Poor individuals and households, Youth-girls, Youth-boys, Elderly, Farmers, Fishers, Pastoralists, Landless people/groups, Ethnic minorities, marginalised groups*	checkboxes
43	To what extent have vulnerable groups/individuals been considered in the following?	*In the project design process, for planned implementation, In terms of impact, Structures to inclusively involve vulnerable groups in decision-making processes:* *1 - not mentioned at all, 2 - mentioned only, 3 - mentioned with marginal detail of how they were/planned to be included, 4 - Mentioned thoroughly with clear detail of how they were/planned to be included*	multiple choice grid
44	If needed, qualitatively expand on the previous question		long answer (open ended)
Section Three: Sustainability considerations			
45	Were any of the following words used in the project documentation text?	*sustainability, sustainable, scalability, scalable, longevity, viable, viability, continued, continue, continuous, long-term, future, future proof, exit strategy*	checkboxes
46	Through qualitative narrative, analyse the text coded for the word searches and write up findings pertaining to sustainability, including whether equity was related at all?		long answer (open ended)
47	Were structures and mechanisms put in place or planned to be put in place to ensure project sustainability after the funding period closes?	*Not mentioned at all, Structures mentioned only, Structures mentioned with marginal detail of how they are planned to be used, Structures thoroughly mentioned with clear plans showing how they will be used to ensure sustainability*	multiple choice

48	In relation to the previous question, briefly explain these sustainability structures (including whether and how equity is/is not incorporated)		long answer (open ended)
Section Four: Monitoring and evaluation, Risks and Social Safeguards			
49	Is the Monitoring and Evaluation plan available in the project documentation?	*Yes, no*	multiple choice
50	Does the Monitoring and Evaluation track equity and sustainability?	*Equity, Sustainability, N/A (if there is no M&E plan), None*	checkboxes
51	If ticked in previous question, qualitatively expand on how equity and sustainability are integrated into the Monitoring and Evaluation framework?		long answer (open ended)
52	Are Social Safeguards noted in the project planning documentation?	*Yes, no*	multiple choice
53	If yes, which Safeguard policies were mentioned?	*Environmental and Social Assessment, Management and Monitoring, Biodiversity Conservation, Sustainable Management of Living Resources, Restrictions of Land use and Involuntary Resettlement, Indigenous Peoples, Cultural Heritage, Resource Efficiency and Pollution Prevention, Labour & Working Conditions, Community Health, Safety & Security, Natural Habitats, Pest Management, Safety of Dams, Projects in Disputed Areas, Projects on International Waterways, Other*	checkboxes
54	Qualitatively expand on Social Safeguard policies considered in the project documentation including how these relate to equity and sustainability		long answer (open ended)
55	Do the mentioned risks consider any of the following	*Distributional equity, Recognitional equity, Procedural equity, Sustainability, Unclear*	checkboxes
56	Describe further how equity and sustainability are integrated into the mentioned risks		long answer (open ended)

Annex 5: Project codebook

Project codebook: Question numbers 5, 7, 9, 11 & 13 based on Holden et al. (in prep)			
Q. no	Categories	Description	References
1		Project name as per project documentation	
2		Project ID as per TES NbS database	
3		Project documentation: Project Information Form (PIF) or project concept outlining initial plans for a project	
3		Project documentation: Project Appraisal Document or equivalent giving detailed plans for the project	
3		Project documentation: CEO endorsement, which details revisions through consultation with fund CEO and provides a summary of the project document.	
4		Focal meaning singular focus on one broad type of NbS or does it focus on a number of broad NbS approaches.	
5	Restoration	Active or passive interventions that involve returning degraded, damaged, or destroyed ecosystems to a pre-disturbance natural state, including their structure or function. Also includes the restoration of natural (or wild) resources such as reintroduction or species but excludes agrobiodiversity restoration which falls under the Sustainable Management. 'Restoration' can be synonymous with reclamation, reforestation, rehabilitation, revegetation, and reconstruction. Restoration can also be referred to as ecological, functional, habitat, or structural.	(Roe, D et al., 2021, Seddon et al., 2021)
5	Protection	Interventions involving a "clearly defined geographical area through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, 2008). This can involve land site specific protection, including protected areas and their management, private land conservation measures, reserves, or conservancies, areas protected by Indigenous Peoples and local communities (e.g., sacred sites), or locally managed terrestrial areas with specific set-aside 'conservation zones'. Can involve protecting a natural or created habitat.	(Roe, D et al., 2021, Seddon et al., 2021)
5	Sustainable Management	A mix of Seddon et al 2021's 'Harness and Manage' categories. These include interventions that make use of ecosystem functions and services (such as nutrient cycling, soil formation, water infiltration, pollination, natural pest control) to maintain or enhance food production and other activities not related to food production. Food production examples include agroforestry, conservation agriculture, permaculture activities, silvopasture, ecosystem-based fisheries and enhancing crop diversity using traditional crop varieties. Excludes industrial agriculture which relies on chemical inputs and/or depletes biodiversity. Non-food production examples include forestry or forest management (e.g., for timber, for non-timber forest products or for producing other ecosystem goods and services), species management (for example for hunting, tourism, trade, or conservation). Can involve managing natural or created habitat.	(Roe, D et al., 2021, Seddon et al., 2021)
5	Creation	Interventions that establish novel ecosystems. These include creating a new habitat type in place of the naturally occurring one (e.g., afforestation of former grasslands, created wetlands, mangrove plantations and shelterbelts) or where the habitat is modified such that it does not resemble its natural ecological state (e.g. rehabilitating degraded land with exotic species or reforesting an area with a single species where it should be a diverse forest). Created	(Roe, D et al., 2021, Seddon et al., 2021)

		agroecosystems are excluded as these are included under the category of sustainable management. In many cases these interventions occur in cities and near cities but can also be implemented across the broader landscape.	
7	Natural/semi-natural	All interventions occurring within and outside a "clearly defined geographical area through legal or other effective means, to achieve the long-term conservation of nature along with their associated ecosystem services and cultural values" (Dudley, 2008). This does not include working lands described below.	(Dudley, 2008, Roe, D et al., 2021, Seddon et al., 2021)
7	Working lands	All interventions occurring on working lands that are not specifically managed for the long term aim of conservation rather the focus is on harnessing a core set of ecosystem services for food production and non-food production services such as materials or fibre. These interventions do however result in an improvement of the state of biodiversity in comparison to a pre-intervention state.	(Dudley, 2008, Roe, D et al., 2021, Seddon et al., 2021)
7	Novel	All interventions occurring on relatively to heavily transformed lands that are not specifically managed for the long term ai, of conservation rather the focus is on harnessing a core set of ecosystem services for a range of ecosystem services. These interventions should in principle result in an improvement of the state of biodiversity in comparison to pre-intervention state. However, this is not always the case in practice.	(Dudley, 2008, Roe, D et al., 2021, Seddon et al., 2021)
8	Forests	Includes moderate to highly productive ecosystems with closed tree canopies. Vegetation complex and diverse, with high level of faunal diversity and endemism. Productivity and biomass determined by 1) rainfall gradients (associated with the intertropical convergence zone), 2) altitudinal gradients in precipitation, cloud cover and temperature, and 3) soil gradients that influence nutrient availability.	(Ecoregions, 2017, Keith et al., 2020)
8	Woodlands	Wooded areas dominated by particular tree communities such as Mopane, Miombo or Baikiaea. These woodlands support a wide range of large mammal diversity and biomass. Within Southern Africa, falls predominantly in sub-tropical to tropical summer rainfall areas.	(Ecoregions, 2017)
8	Shrublands	Areas dominated by low-to-medium shrub vegetation (fynbos heath, succulents, small bushes/shrubs) and in some areas, perennial grasses.	(Ecoregions, 2017)
8	Grasslands	Ecological function within the grasslands and savanna biome are closely linked to a mostly continuous layer of grasses that contribute moderate to high levels of primary productivity driven by strongly seasonal water surplus and deficit cycles. This system is made up of temporally and spatially variable C3-C4 grass mixture, with high productivity due to rapidly produced nitrogen-rich biomass.	(Keith et al., 2020)
8	Savannas	Ecological function within the grasslands and savanna biome are closely linked to a mostly continuous layer of grasses that contribute moderate to high levels of primary productivity driven by strongly seasonal water surplus and deficit cycles. Co-existence between trees and grasses mediated by herbivory and fire. Savannas have unique plant and animal diversity within a complex trophic structure dominated by mammalian herbivores and predators. Seasonal high productivity and tolerant to seasonal drought.	(Keith et al., 2020)
8	Deserts and Semi-deserts	Low to very low biomass ecosystems occurring in arid or semi-arid climates. Productivity is low due to low rainfall, temperature extremes and high winds. Desert species well adapted with wide variety of life-history traits for water acquisition and conservation. Desert systems made up of long-lived drought tolerators (low metabolic rate) and drought evaders (high mobility or short-lived active phases). Mobility allows organisms to track resources across large distances.	(Keith et al., 2020)

8	Floodplains	Associated with, adjacent river channels, which provide water and sediment during flooding.	(Keith et al., 2020)
8	Wetlands	These systems include vegetated floodplains, groundwater seeps, and sinks with permanent or non-permanent surface water. Soil saturation may result in oxygen deprivation below water, suppressing decomposition and sometimes resulting in peat build up. Precipitation, run-off, local evapotranspiration and substrate type influence resource availability and productivity. Spatial heterogeneity is a key characteristic and at a landscape scale, they act is important resource sinks and refuges. They provide key foraging and breeding sites for a range of invertebrates and vertebrates.	(Keith et al., 2020)
8	Plantations	Moderate to high productivity autotrophic systems established by translocation (planting or seeding) of woody perennial plants. May involve selective breeding or molecular engineering to promote rapid plant growth, efficient resource capture, enhanced resource allocation, and tolerance of harsh environmental conditions, insect predators and diseases. System dependent on planted species and subsequent management. Systems may be made up of monocrops or mixed forest plantings (more complex). Successional feedbacks occur (after secondary successional processes) as structural complexity increases. High to moderate natural water availability and nutrients supplemented by human inputs such as fertiliser, mulch, landscape drainage modification, and possible irrigation. Artificial disturbance regimes include the complete or partial removal of biomass and soil turnover, which occurs sub-decadal to multi-decadal intervals.	(Keith et al., 2020)
8	Croplands	Simple, low-diversity, high-productivity croplands maintained by intensive anthropogenic supplementation of nutrients, water, and artificial disturbance regimes (i.e., annual cultivation), translocation (i.e., sowing) and annual harvesting. Dominated by one or few shallow-rooted annual plant species, such as grains, vegetables, 'flowers', legumes, or fibre species harvested annually by humans for food production, materials, or ornamental display. These systems have low functional, genetic, and taxonomic diversity and no local endemism. Productivity is highly sensitive to resource variability. Rainfall and soil nutrients supplemented by irrigation, landscape drainage modification and fertilisers. Typically, flat to moderate terrain.	(Keith et al., 2020)
8	Sown or Semi-natural Pastures	Sown pasture: Low-diversity, high-productivity pastures maintained by anthropogenic supplementation of nutrients (rarely water) and artificial disturbance (ploughing), translocation (sowing and livestock movement) and harvesting of plants or animals, to semi-natural pasture or grasslands where woody vegetation has been removed or modified for agriculture. These semi-natural pastures are simply structured with low to high productivity, with a mixed indigenous and non-indigenous fauna.	(Keith et al., 2020)
8	Natural or Semi-natural Rangelands	Domestic or wildlife grazing lands generally including grasslands, woodlands, shrublands, and to some extent deserts. They supply animal products for livestock rearing.	(D'Adamo et al., 2021)
9	Agroforestry	The intentional integration of trees on crop or pastureland	(Bettles et al., 2021)
9	Conservation Agriculture	A farming system that promotes the practical application of three interlinked principles, namely: no or minimum mechanical soil disturbance, biomass mulch soil cover and crop species diversification, in conjunction with other complementary good agricultural practices of integrated crop and production management.	(Kassam, Friedrich & Derpsch, 2019)
9	Sustainable Forest Management	Addresses forest degradation and deforestation while increasing direct benefits to people and the environment	(Riccioli et al., 2020)

9	Sustainable Land Management	Sustainable land-use has been defined as the 'rational development, use and protection of land resources based on specific space–time conditions and adopting appropriate means and organizational forms. It is a land resource utilisation method that can meet the needs of contemporary people and meet the needs of future generations without posing a risk. This approach can meet the needs of human economic life and the environment and can continuously improve the quality characteristics of resources.	(Xie et al., 2020)
9	Public Protected Areas	Clearly defined geographical area through legal means with governance by the government (federal, national, or subnational ministry/agency in charge or government-delegated management), to achieve the long-term conservation of nature with associated ecosystem services and cultural values.	(Dudley, 2008)
9	Private Protected Areas	Clearly defined geographical area through legal means with governance by the private sector (including individual, NGOs and non-profit, or for-profit), to achieve the long-term conservation of nature with associated ecosystem services and cultural values.	(Dudley, 2008)
9	Restoration	Active or passive interventions that involve returning degraded, damaged, or destroyed ecosystems to a pre-disturbance natural state, including their structure or function. Also includes the restoration of natural (or wild) resources such as reintroduction or species but excludes agrobiodiversity restoration which falls under the Sustainable Management. 'Restoration' can be synonymous with reclamation, reforestation, rehabilitation, revegetation, and reconstruction. Restoration can also be referred to as ecological, functional, habitat, or structural.	(Roe, D et al., 2021, Seddon et al., 2021)
9	Sustainable Ecosystem Management	See Sustainable land, forest, and rangeland management but this can occur in any ecosystem type but excludes working lands.	(Roe, D et al., 2021, Seddon et al., 2021)
9	Sustainable Natural Resource Management	A focus on harvesting regulations, quotas, or designated resource use zones.	(Roe, D et al., 2021)
9	Community Protected Areas	Clearly defined geographical area through legal or effective means with governance by local communities and indigenous peoples, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Declared and run by local communities.	(Dudley, 2008)
9	Public-Private Protected Areas (can include stewardship agreements)	See Public Protected Areas above but with collaborative management or joint management with the private sector.	(Dudley, 2008)
9	Sustainable Rangeland Management	See sustainable land management above but focused on rangelands on which the natural vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing use and these areas are used for grazing and browsing	(Xie et al., 2020)
9	Reforestation	See restoration but with a focus only on naturally occurring forest species.	(Roe, D et al., 2021, Seddon et al., 2021)
9	Afforestation	See creation above. This focuses on planting trees (exotic or indigenous) in ecosystems which are not naturally comprised of forest species or planting monocultures of exotic or indigenous forest species in forest ecosystems.	(Roe, D et al., 2021, Seddon et al., 2021)
9	Sustainable Agriculture Intensification	An agricultural process or system where valued outcomes are maintained or increased while progressing to substantial enhancement of environmental outcome.	(Pretty, 2018)

9	Public-Community Protected Areas	See Public Protected Areas above but with collaborative management or joint management with communities.	(Dudley, 2008)
9	Transboundary Protected Areas	See Public Protected Areas above but with transboundary management (various levels across international borders).	(Dudley, 2008)
11	Nature-based Solutions	Nature-based Solutions (NbS) involve the protection, restoration and management of natural and semi-natural ecosystems, the sustainable management of working lands and aquatic systems, and the creation of novel ecosystems in and around cities or across the wider landscape. NbS aims to address societal challenges including climate change, food and water security, natural disasters, human health, and/or social and economic development while increasing biodiversity and human well-being in an equitable manner relative to the pre-NbS state.	(Chausson et al., 2020, Cohen-Shacham et al., 2016, Cohen-Shacham et al., 2019, Seddon et al., 2021)
11	Natural Climate Solutions	Conservation and management actions that reduce greenhouse gas (GHG) emissions from ecosystems and harness their potential to store carbon.	(Griscom Bronson et al., 2017)
11	Ecosystem-based adaptation	The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change (CBD, 2009)	(CBD, 2009)
11	Community-based adaptation	Community-based adaptation (CBA) is a form of adaptation that aims to reduce the risks of climate change to the world's poorest people by involving them in the practices and planning of adaptation	(Forsyth, 2013)
11	Ecosystem-based disaster risk reduction	The sustainable management, conservation, and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development.	(Nehren et al., 2014)
11	Climate adaptation services	The benefits to people from increased social ability to respond to change, provided by the capacity of ecosystems to moderate and adapt to climate change and variability	(Lavorel et al., 2015)
11	Ecosystem-based mitigation	Managing ecosystems in a way that counteracts anthropogenic climate change, in particular by reducing emissions of greenhouse gases and enhancing removals of greenhouse gases from the atmosphere	(Epple et al., 2016)
11	Forest Landscape restoration	The long-term process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes	(IUCN, 2014)
11	REDD+	Reducing Emissions from Deforestation and forest Degradation, and fostering conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries.	(UNFCCC, 2014)
11	Payment for Ecosystem Services	Payment for ecosystem services (PES) programs are economic incentives for environmental conservation. They are generally defined as "a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources"	(Ruggiero et al., 2019)
11	Community-based Payment for Ecosystem Services	Local PES initiatives that engage communities, resource users and institutions in program design, implementation, or monitoring.	(Brownson et al., 2019)
11	Ecological Infrastructure	Artificial or natural actions that aim to enhance chosen ecosystem services in intact to transformed landscapes, informed by an understanding of ecology. Examples of natural interventions include alien plant clearing and revegetation, and examples of artificial interventions include artificial wetlands, permeable pavements, and erosion control structures (gabions and weirs).	(Rebelo et al., 2021)

11	Community based Natural Resource Management	Community-based natural resource management (CBNRM) is an approach that incorporates “local institutions, customary practices, and knowledge systems in management, regulatory, and enforcement processes”	(Robinson et al., 2021)
11	Community-Based Conservation	Programs seeking to improve resource management through engagement with local communities, resource users and institutions at multiple levels (Armitage, 2005). These programs link conservation with development objectives and either directly engage with communities or devolve resource management to communities. Includes programs described as Community-Based Natural Resource Management (CB-NRM) and Integrated Conservation and Development Projects (ICDP).	(Brownson et al., 2019)
13	to note:	If the project is focused on food security under climate change, then tick food security and climate change adaptation. If there is no climate change focus only click food security. Use this reasoning for all items below.	
13	Food security	A state that prevails when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development, and an active and healthy life. This can include changes to productivity and thereby food supply. This can include direct measures of production (crop yield, fodder supply, livestock production) and indirect measures (irrigation water supply, soil fertility and moisture). Access to food and availability of resources for supporting food production and preparation. This can be under business as usual or linked to climate change. If linked to climate change, please also tick the appropriate climate change box.	(Allwood et al., 2014, Roe, D et al., 2021)
13	Water security	The reliable availability of an acceptable quantity and quality of water for health, livelihoods, and production, coupled with an acceptable level of water-related risks. This can include changes to ground, soil and surface water storage, water quality, water supply for drinking and irrigation. This can be under business as usual or linked to climate change. If linked to climate change, please also tick the appropriate climate change box.	(Grey & Sadoff, 2007, Roe, D et al., 2021)
13	Energy security	To maintain an adequate, stable, and predictable energy supply. This can include changes in the availability and access to fuelwood, hydropower, cleaner or more efficient energy. If linked to climate change, please also tick the appropriate climate change box. This can be under business as usual or linked to climate change. If linked to climate change, please also tick the appropriate climate change box.	(Allwood et al., 2014, Roe, D et al., 2021)
13	Human health	Availability and access to medicine and medical care, production of medicinal plants or other health products derived from the NbS, incidents of illness and disease or conditions that cause them (water-borne diseases, air pollution, poor nutrition). This can be under business as usual or linked to climate change. If linked to climate change, please also tick the appropriate climate change box.	(Roe, D et al., 2021)
13	Climate change adaptation	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects. This therefore includes changes in exposure to climate impacts (e.g., damages from storms and floods; crop and water losses from droughts), sensitivity to climate impacts (e.g., availability of alternative to buffer against losses under climate impacts),	(Allwood et al., 2014, Roe, D et al., 2021)
13	Climate change mitigation	A human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs). In this case the focus is on the removal of greenhouse gas emissions from the atmosphere through soil or vegetation carbon sequestration and storage or the prevention of sources of greenhouse gas emissions from vegetation removal or degradation and other land management practices.	(Allwood et al., 2014)

13	Disaster risk reduction	Exposure and sensitivity to disasters and community adaptive capacity to respond to disasters. This can be under business as usual or linked to climate change. If linked to climate change, please also tick the appropriate climate change box.	(Roe, D et al., 2021)
13	Local economic development	Availability of jobs, opportunities for income generation (e.g., from harvesting wild or cultivated goods or from ecotourism, PES schemes or carbon credits)	(Roe, D et al., 2021)
13	Local social development	Availability and access to other subsistence goods, access to education or infrastructure	(Roe, D et al., 2021)
13	Biodiversity loss	Loss of the number, abundance, composition, spatial distribution, and interactions of genotypes, populations, species, functional types and traits, and landscape units in a given system	(Díaz et al., 2006)
13	Conservation broadly	For intrinsic, utilitarian, or non-utilitarian reasons.	(de Groot et al., 2010)
13	Poverty	The lack of, or the inability to achieve, a socially acceptable standard of living.	(Bellù & Paolo, 2005)
13	Sustainable livelihoods	A focus on livelihoods that can cope with and recover from the stresses and shocks and maintain or enhance its capabilities and assets both now and in the future without undermining the natural resource base.	(Chambers & Conway, 1991)
29, 30, 35,36	Distributional equity	Distributional equity signifies the fairness of distribution of benefits and burdens between different groups, including current and future generations, of the outcomes of conservation actions.	(Bennett, 2020, Holden, Hoffman & Shackleton, 2022, Leach et al., 2018)
29	Income	Variations: Remuneration, wages, economic opportunity	
29	Livelihoods	Stem: Livelihood (of relevance to distributional equity - access to livelihood opportunities/improved livelihoods)	
29	Benefits	Stem: Benefit	
29	Disbenefits	Stem: Disbenefit	
29	Fairness	Stem: Fair	
29	Capacity building	Variations & stems: education, educate, educated, training, train	
29	Equity	Equitable based on Distributional equity signifies the fairness of distribution of benefits and burdens between different groups, including current and future generations, of the outcomes of conservation actions.	
29	Well-being	Variations: health, security, welfare	
29	Impact	Stem: impacts, impactful	
29	Beneficiaries	Stem: Beneficiary	
29	Other	Words or sentences that seemed relevant to distributional equity, which will then be grouped into relevant categories	

31, 32, 35, 36	Recognitional equity	Recognitional equity refers to the acknowledgement and representation of the rights, cultures and identities, values and visions, knowledge systems and livelihoods of local groups in conservation planning and management.	(Bennett, 2020, Holden, Hoffman & Shackleton, 2022, Leach et al., 2018)
31	Rights	Stem: right	
31	Livelihoods	Stem: livelihood (of relevance to recognitional equity - recognition of current/existing livelihoods in the project area and the potential impact of project interventions on these)	
31	Culture	Variations: tradition, traditions, traditional, heritage	
31	Traditional knowledge	Variation: Indigenous knowledge	
31	Representation	Stem: Represent	
31	Equity	Stem: Equitable, based on Procedural equity concerns the inclusive and effective participation of all relevant actors and groups in rule and decision-making for conservation policies and programs	
31	Identity		
31	Practices	Stem: practice (referring to local practices)	
31	Recognition		
31	Respects	Stems: respectful	
31	Values and visions	Stem: Value, vision,	
31	Other	Words or sentences that seemed relevant to recognitional equity, which will then be grouped into relevant categories	
33,34,35,36	Procedural equity	Procedural equity concerns the inclusive and effective participation of all relevant actors and groups in rule and decision-making for conservation policies and programs.	(Bennett, 2020, Holden, Hoffman & Shackleton, 2022, Leach et al., 2018)
33	Consent		
33	Transparency	Stem: transparent	
33	Consultation	Stem: consult, consulted (in relation to local communities)	
33	Participation	Stem: participate, participated (in relation to local communities)	
33	Trust		
33	Equity	Equitable - based on Procedural Equity: concerns the inclusive and effective participation of all relevant actors and groups in rule and decision-making for conservation policies and programs	

33	Informed	Stem: Inform	
33	Involvement	Stem: Involve	
33	Free, prior, and informed consent		
33	Stakeholder Engagement	Stem: engage, engaged (in relation to local communities)	
33	Other	Words or sentences that seemed relevant to procedural equity, which will then be grouped into relevant categories	
35	not considered at all	not considered at all - no mention of equity aspects	
35	considered only	considered only - equity aspect/s mentioned only with no detail of how this is addressed	
35	considered with marginal detail of how this is addressed	equity aspects mentioned with marginal detail of how this is addressed (little detail)	
35	considered thoroughly with clear details of how this is addressed	Equity aspects thoroughly mentioned with clear plans showing how this is addressed	
37,38,39,43	not mentioned at all	No mention of structures to include relevant actors in decision making processes	
37,38,39,43	Structures mentioned only	Structures are mentioned but only briefly with little to no detail.	
37,38,39,	Structures thoroughly mentioned	Structures are mentioned with clear detail of who is involved and where these structures fit into the project	
37,38,39,43	Structures thoroughly mentioned with clear plans showing how	Structures are mentioned with clear detail of who is involved and where these structures fit into the project and clear plans and detail showing how these structures will facilitate the inclusion of relevant actors into decision-making processes	
43	not mentioned at all	no mention of vulnerable groups/individuals	
43	mentioned only	vulnerable groups identified and mentioned with no further detail	
43	mentioned with marginal detail of how they were/planned to be included	vulnerable groups identified with some detail of who is involved and where they fit into the project	
43	mentioned thoroughly with clear detail of how they were/planned to be included	vulnerable groups identified with clear detail of who is involved and where they fit into the project with clear plans and detail showing how they are actively	
Section 4	Sustainability	‘The long-term maintenance of desirable and meaningful life support systems which are biophysically, culturally and socially determined’	(Leach et al., 2018)

45	Sustainability	Stem: Sustainable, sustain	
45	Scalability	Stem: Scalable,	
45	Longevity		
45	Viability	Stem: Viable	
45	Continued	Stem: Continue, continuous	
45	Future	Variations: future-proof	
45	Exit strategy		
47	not mentioned at all	No mention of structures to support project aims/outcomes after the funding has come to an end	
47	Structures mentioned only	Structures are mentioned but only briefly with no detail	
47	Structures mentioned with marginal detail of how they are planned to be used	Structures are mentioned with some detail of who is involved and where these structures fit into the project	
47	Structures thoroughly mentioned with clear plans showing how they will be used to ensure sustainability	Structures are mentioned with clear detail of who is involved and where these structures fit into the project and clear plans and detail showing how these structures will facilitate the project aims/outcomes after the funding period has come to an end.	

References

Acreman, M., Smith, A., Charters, L., Tickner, D., Opperman, J., Acreman, S., Edwards, F., Sayers, P. et al. 2021. Evidence for the effectiveness of nature-based solutions to water issues in Africa. *Environmental Research Letters.* 16(6):063007. DOI:10.1088/1748-9326/ac0210.

Allwood, J.M., Bosetti, N.K., Dubash, L., Gómez-Echeverri & von Stechow, C. 2014. *Glossary. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]*. Cambride, United Kingdom and New York, USA: C.U. Press. Available: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-i.pdf [06.06.2022].

Andersson, J.A. & D'Souza, S. 2014. From adoption claims to understanding farmers and contexts: A literature review of Conservation Agriculture (CA) adoption among smallholder farmers in southern Africa. *Agriculture, Ecosystems & Environment.* 187:116-132. DOI:https://doi.org/10.1016/j.agee.2013.08.008.

Angelstam, P., Barnes, G., Elbakidze, M., Marais, C., Marsh, A., Polonsky, S., Richardson, D.M., Rivers, N. et al. 2017. Collaborative learning to unlock investments for functional ecological infrastructure: Bridging barriers in social-ecological systems in South Africa. *Ecosystem Services.* 27:291-304. DOI:https://doi.org/10.1016/j.ecoser.2017.04.012.

Barendse, J., Roux, D., Currie, B., Wilson, N. & Fabricius, C. 2016. A broader view of stewardship to achieve conservation and sustainability goals in South Africa. *South African Journal of Science.* 112:1-15. Available: http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0038-23532016000300010&nrm=iso.

Bellù, L.G. & Paolo, L. 2005. *Impacts of Policies on Poverty: The Definition of Poverty*. Available: https://mpra.ub.uni-muenchen.de/44644/1/MPRA_paper_44644.pdf [04.07.2021].

Bennett, N.J., Calò, A., Di Franco, A., Niccolini, F., Marzo, D., Domina, I., Dimistriadis, C., Sobrado, F., Santoni, M, Charbonnel, E., Trujillo, M., Garcia-Charton, J., Seddiki, L., Cappanera, V., Grbin, J., Kastelic, L., Milazza, M and Guidetti, P. 2020. Social equity and marine protected areas: Perceptions of small-scale fishermen in the Mediterranean Sea. *Biological Conservation.* 244. DOI:https://doi.org/10.1016/j.biocon.2020.108531.

Bettles, J., Battisti, D.S., Cook-Patton, S.C., Kroeger, T., Spector, J.T., Wolff, N.H. & Masuda, Y.J. 2021. Agroforestry and non-state actors: A review. *Forest Policy and Economics.* 130:102538. DOI:https://doi.org/10.1016/j.forpol.2021.102538.

Black, D., Turpie, J.K. & Rao, N. 2016. Evaluating the cost-effectiveness of ecosystem-based adaptation : Kamiesberg Wetlands case study. *South African Journal of Economic and Management Sciences.* 19(5):702-713. DOI:doi:10.10520/EJC-4c70a9dfa.

Blaikie, P. 2006. Is Small Really Beautiful? Community-based Natural Resource Management in Malawi and Botswana. *World Development.* 34(11):1942-1957. DOI:https://doi.org/10.1016/j.worlddev.2005.11.023.

Bond, W.J., Stevens, N., Midgley, G.F. & Lehmann, C.E.R. 2019. The Trouble with Trees: Afforestation Plans for Africa. *Trends in Ecology & Evolution.* 34(11):963-965. DOI:https://doi.org/10.1016/j.tree.2019.08.003.

Bourne, A., Holness, S., Holden, P., Scorgie, S., Donatti, C.I. & Midgley, G. 2016. A Socio-Ecological Approach for Identifying and Contextualising Spatial Ecosystem-Based Adaptation Priorities at the Sub-National Level. *PLoS ONE.* 11. Available: https://link-gale-com.ezproxy.uct.ac.za/apps/doc/A453533628/AONE?u=unict&sid=bookmark-AONE&xid=c83a4eee [2022/5/26/].

Brownson, K., Guinessey, E., Carranza, M., Esquivel, M., Hesselbach, H., Madrid Ramirez, L. & Villa, L. 2019. Community-Based Payments for Ecosystem Services (CB-PES): Implications of community involvement for program outcomes. *Ecosystem Services.* 39:100974. DOI:10.1016/j.ecoser.2019.100974.

Cartwright, A., Blignaut, J., De Wit, M., Goldberg, K., Mander, M., O'Donoghue, A., Roberts, D. 2013. Economics of climate change adaptation at the local scale under conditions of uncertainty and resource constraints: the case of Durban, South Africa. *Sage.* 25, Issue 1. Available: https://journals.sagepub.com/doi/full/10.1177/0956247813477814 [07.11.2021].

CBD. 2009. *Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change*. Available: https://www.cbd.int/doc/publications/cbd-ts-41-en.pdf [17.11.2021].

CFU. 2019a. *Climate Fund Update: Least Developed Countries Fund*. Heinrich Böll Stiftung. Available: https://climatefundsupdate.org/the-funds/least-developed-countries-fund-2/ [2022, 05.04].

CFU. 2019b. *Climate Fund Update: Global Environment Facility*. Heinrich Böll Stiftung. Available: https://climatefundsupdate.org/the-funds/global-environment-facility-gef/ [2022, 05.04].

CFU. 2019c. *Climate Fund Update: Adaptation Fund* Heinrich Böll Stiftung. Available: https://climatefundsupdate.org/the-funds/adaption-fund/ [2022, 04.04].

CFU. 2019d. *Climate Fund Update: Green Climate Fund*. Heinrich Böll Stiftung. Available: https://climatefundsupdate.org/the-funds/green-climate-fund/ [2022, 05.04].

Chambers, R. & Conway, G.R. 1991. Sustainable rural livelihoods: practical concepts for the 21st century. *IDS Discussion Paper.* Available: https://www.ids.ac.uk/publications/sustainable-rural-livelihoods-practical-concepts-for-the-21st-century/ [03.07.2021](Issue 296).

Chan, N.W. 2019. Funding Global Environmental Public Goods Through Multilateral Financial Mechanisms. *Environmental and Resource Economics.* 73(2):515-531. DOI:10.1007/s10640-018-0272-6.

Chausson, A., Turner, B., Seddon, D., Chabaneix, N., Girardin, C.A.J., Kapos, V., Key, I., Roe, D. et al. 2020. Mapping the effectiveness of nature-based solutions for climate change adaptation. *Global Change Biology.* 26(11):6134-6155. DOI:10.1111/gcb.15310.

Cockburn, J., Palmer, C.G., Biggs, H. & Rosenberg, E. 2018. Navigating Multiple Tensions for Engaged Praxis in a Complex Social-Ecological System. *Land.* 7(4):129. Available: https://www.mdpi.com/2073-445X/7/4/129.

Cohen-Shacham, E., Walters, G., Janzen, C. & Maginnis, S.e. 2016. *Nature-based Solutions to address global societal challenges*. Gland, Switzerland[15.03.2022].

Cohen-Shacham, E., Andrade, A., Dalton, J., Dudley, N., Jones, M., Kumar, C., Maginnis, S., Maynard, S. et al. 2019. Core principles for successfully implementing and upscaling Nature-bases Solutions. *Environmental Science and Policy.* 98 (2019):20-29. DOI:https://doi.org/10.1016/j.envsci.2019.04.014.

Coldrey, K. 2020. *Options for financing ecological infrastructure interventions in South Africa: lessons from international experience. A report for the Socio-Economic Benefits of Investing in Ecological Infrastructure (SEBEI) project*. Cape Town. Available: https://webcms.uct.ac.za/sites/default/files/image_tool/images/450/Projects/SEBEI/Options%20for%20financing%20EI%20interventions%20in%20South%20Africa_12%20June%202020.pdf [07.06.2022].

Coldrey, K., Cullis, J.D.S., Esler, K.J., Fold, N., Gokool, S., Hallowes, J., Holden, P.B., Methner, N. et al. 2022. *Investment Brief: Ecological Infrastructure for Water and Socio-Economic Security: A report for the Socio-Economic Benefits of Investing in Ecological Infrastructure (SEBEI) project*. Available: https://webcms.uct.ac.za/sites/default/files/image_tool/images/450/SEBEI%20Investment%20Brief%20-%20HR.pdf [07.06.2022].

Crookes, D.J., Blignaut, J.N., de Wit, M.P., Esler, K.J., Le Maitre, D.C., Milton, S.J., Mitchell, S.A., Cloete, J. et al. 2013. System dynamic modelling to assess economic viability and risk trade-offs for ecological restoration in South Africa. *Journal of Environmental Management.* 120:138-147. DOI:https://doi.org/10.1016/j.jenvman.2013.02.001.

Cumming, T.L., Shackleton, R.T., Förster, J., Dini, J., Khan, A., Gumula, M. & Kubiszewski, I. 2017. Achieving the national development agenda and the Sustainable Development Goals (SDGs) through investment in ecological infrastructure: A case study of South Africa. *Ecosystem Services.* 27:253-260. DOI:https://doi.org/10.1016/j.ecoser.2017.05.005.

D'Adamo, F., Ogutu, B., Brandt, M., Schurgers, G. & Dash, J. 2021. Climatic and non-climatic vegetation cover changes in the rangelands of Africa. *Global and Planetary Change.* 202:103516. DOI:https://doi.org/10.1016/j.gloplacha.2021.103516.

Davidson, D. 2016. Gaps in agricultural climate adaptation research. *Nature Climate Change.* 6(5):433-435. DOI:10.1038/nclimate3007.

Davidson, M. 2013. On the relation between ecosystem services, intrinsic value, existence value and economic valuation. *Ecological Economics.* 95:171-177. DOI:https://doi.org/10.1016/j.ecolecon.2013.09.002.

Dawson, N.M., Mason, M., Mwayafu, D.M., Dhungana, H., Satyal, P., Fisher, J.A., Zeitoun, M. & Schroeder, H. 2018. Barriers to equity in REDD+: Deficiencies in national interpretation processes constrain adaptation to context. *Environmental Science & Policy.* 88:1-9. DOI:https://doi.org/10.1016/j.envsci.2018.06.009.

de Groot, R.S., Fisher, B., Christie, M., Aronson, J., Braat, L., Haines-Young, R., Gowdy, J., Maltby, E. et al. 2010. Integrating the ecological and economic dimensions in biodiversity and ecosystem service valuation in In *The Economics of Ecosystems and Biodiversity (TEEB): Ecological and Economic Foundations.* P. Kumar, Ed.: Routledge. Available: http://www.teebweb.org/wp-content/uploads/Study%20and%20Reports/Reports/Ecological%20and%20Economic%20Foundations/TEEB%20Ecological%20and%20Economic%20Foundations%20report/TEEB%20Foundations.pdf [06.05.2022].

Díaz, S., Fargione, J., Chapin Iii, F.S. & Tilman, D. 2006. Biodiversity loss threatens human well-being. *PLoS biology.* 4(8):1300-1305. DOI:10.1371/journal.pbio.0040277.

Dilling, L., Prakash, A., Zommers, Z., Ahmad, F., Singh, N., de Wit, S., Nalau, J., Daly, M. et al. 2019. Is adaptation success a flawed concept? *Nature Climate Change.* 9(8):572-574. DOI:10.1038/s41558-019-0539-0.

Dinerstein, E., Olson, D., Joshi, A., Vynne, C., Burgess, N.D., Wikramanayake, E., Hahn, N., Palminteri, S. et al. 2017. An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm. *BioScience.* 67(6):534-545. DOI:10.1093/biosci/bix014.

Dlamini, C., Larwanou, M. & Chirwa, P.W. 2015. A brief overview of the capacities of public forest administrations in climate change work in the moist forests countries of Sub-Saharan Africa. *The International Forestry Review.* 17:53-66. Available: https://www-jstor-org.ezproxy.uct.ac.za/stable/26431607 [2022/06/07/].

Dudley, N.e. 2008. *Guidelines for Applying Protected Area Management Categories* Gland, Switzerland: IUCN.
Available:https://portals.iucn.org/library/sites/library/files/documents/pag-021.pdf

Dyer, J., Stringer, L.C., Dougill, A.J., Leventon, J., Nshimbi, M., Chama, F., Kafwifwi, A., Muledi, J.I. et al. 2014. Assessing participatory practices in community-based natural resource management: Experiences in community engagement from southern Africa. *Journal of Environmental Management.* 137:137-145.
DOI:https://doi.org/10.1016/j.jenvman.2013.11.057.

Ecoregions. 2017. *Ecoregions 2017 Resolve*. Available: https://ecoregions.appspot.com/ [Available: https://ecoregions.appspot.com/ [02.04.2022]].

Egan, P. & Price, M. 2017. *Mountain ecosystem services and climate change: A global overview of potential threats and strategies for adaptation.*

Epple, C., García Rangel, S., Jenkins, M. & Guth, M. 2016. *Managing ecosystems in the context of climate change mitigation: A review of current knowledge and recommendations to support ecosystem-based mitigation actions that look beyond terrestrial forests*. Montreal. Available: https://www.cbd.int/doc/publications/cbd-ts-86-en.pdf [17.06.2022].

Eriksen, S., Schipper, E.L., Scoville-Simonds, M., Vincent, K., Adam, H.N., Harding, B., Khatri, D.B., Lenaerts, L. et al. 2021. Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance? *World Development.*

Fairhead, J., Leach, M. & Scoones, I. 2012. Green Grabbing: a new appropriation of nature? *The Journal of Peasant Studies.* 39(2):237-261. DOI:10.1080/03066150.2012.671770.

Fleischman, F., Basant, S., Chhatre, A., Coleman, E.A., Fischer, H.W., Gupta, D., Güneralp, B., Kashwan, P. et al. 2020. Pitfalls of Tree Planting Show Why We Need People-Centered Natural Climate Solutions. *BioScience.* 70(11):947-950. DOI:10.1093/biosci/biaa094.

Forsyth, T. 2013. Community-based adaptation: A review of past and future challenges. *Wiley Interdisciplinary Reviews: Climate Change.* 4. DOI:10.1002/wcc.231.

Gandiwa, E., Zisadza-Gandiwa, P., Never, M., Mashapa, C., Jeke, A., Mabika, C., Mutanga, C. & Nyasha, S. 2021. Protected areas and biodiversity conservation in Zimbabwe: history, threats and challenges. 16-36.

GEF. 2020. *Nature-based solutions and the GEF: A STAP Advisory Document*. Available: https://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.C.59.STAP_.Inf_.06_Natured_Based_Solution_GEF.pdf [09.04.2022].

GEF. 2022. *GEF: Who We Are*. Available: https://www.thegef.org/who-we-are [Available: https://www.thegef.org/who-we-are, 20.08.2021].

Gibbes, C. & Keys, E. 2010. The Illusion of Equity: An Examination of Community Based Natural Resource Management and Inequality in Africa. *Geography Compass.* 4(9):1324-1338. DOI:https://doi.org/10.1111/j.1749-8198.2010.00379.x.

Goosen, M. & Blackmore, A.C. 2018. Hitchhikers' guide to the legal context of protected area management plans in South Africa. *Bothalia.* 49(1), a2399. DOI:https://doi.org/10.4102/abc.v49i1.2399

Grey, D. & Sadoff, C.W. 2007. Sink or Swim? Water security for growth and development. *Water Policy.* 9(6):545-571. DOI:10.2166/wp.2007.021.

Griscom Bronson, W., Adams, J., Ellis Peter, W., Houghton Richard, A., Lomax, G., Miteva Daniela, A., Schlesinger William, H., Shoch, D. et al. 2017. Natural climate solutions. *Proceedings of the National Academy of Sciences.* 114(44):11645-11650. DOI:10.1073/pnas.1710465114.

Guerbois, C., Brady, U., de Swardt, A.G. & Fabricius, C. 2019. Nurturing ecosystem-based adaptations in South Africa's Garden Route: a common pool resource governance perspective. *Regional Environmental Change.* 19(7):1849-1863. DOI:10.1007/s10113-019-01508-5.

Hackmann, H., Moser, S.C. & St. Clair, A.L. 2014. The social heart of global environmental change. *Nature Climate Change.* 4(8):653-655. DOI:10.1038/nclimate2320.

Hebinck, P., Kiaka, R.D. & Lubilo, R. 2019. Navigating community conservancies and institutional complexities in Namibia. In *Natural Resources, Tourism and Community Livelihoods in Southern Africa: Challenges of Sustainable Development.* 1st ed. M.T. Stone,

M. Lenao and N. Moswete, Eds.: Routledge. DOI:https://doi-org.ezproxy.uct.ac.za/10.4324/9780429289422.

Holden, P.B., Hoffman, T. & Shackleton, S. 2022. How can a focus on equity in nature-based solutions help to address societal challenges from the ground up? https://doi.org/10.25375/uct.19354070.v1. DOI:https://doi.org/10.25375/uct.19354070.v1.

Holden, P.B., Humphrey, G., Dirk, C., Onyeagoziri, A. & Shackleton, S. in prep. NbS for whom? Exploring the negative impacts and unequal distribution of benefits of NbS in Southern Africa.

Holden, P.B., Rebelo, A.J., Wolski, P., Odoulami, R.C., Lawal, K.A., Kimutai, J., Nkemelang, T. & New, M.G. 2022. Nature-based solutions in mountain catchments reduce impact of anthropogenic climate change on drought streamflow. *Communications Earth & Environment.* 3(1):51. DOI:10.1038/s43247-022-00379-9.

Huntley, B.J., Beja, P., Vaz Pinto, P., Russo, V., Veríssimo, L. & Morais, M. 2019. Biodiversity Conservation: History, Protected Areas and Hotspots. In *Biodiversity of Angola: Science & Conservation: A Modern Synthesis.* B.J. Huntley, V. Russo, F. Lages and N. Ferrand, Eds. Cham: Springer International Publishing. 495-512. DOI:10.1007/978-3-030-03083-4_18.

IDRC. 2021. *International Development Research Centre | Centre de recherches pour le développement international*. Available: https://www.idrc.ca/en [Available: https://www.idrc.ca/en, 06.06.2022].

IUCN. 2014. *A guide to the Restoration Opportunities Assessment Methodology (ROAM): Assessing forest landscape restoration opportunities at the national or sub-national level. Working Paper (Road-test edition)*. Gland, Switzerland. Available: https://www.iucn.org/downloads/roam_handbook_lowres_web.pdf [17.06.2022].

IUCN. 2020. *Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS*. Gland, Switzerland: IUCN[06.06.2022].

Jackson, M.C., Woodford, D.J. & Weyl, O.L.F. 2016. Linking key environmental stressors with the delivery of provisioning ecosystem services in the freshwaters of southern Africa. *Geo: Geography and Environment.* 3(2):e00026. DOI:https://doi.org/10.1002/geo2.26.

Kalaba, K.F., Chirwa, P., Syampungani, S. & Ajayi, C.O. 2010. Contribution of agroforestry to biodiversity and livelihoods improvement in rural communities of Southern African regions. In *Tropical Rainforests and Agroforests under Global Change: Ecological and Socio-economic Valuations.* T. Tscharntke, C. Leuschner, E. Veldkamp, H. Faust, E. Guhardja and A. Bidin, Eds. Berlin, Heidelberg: Springer Berlin Heidelberg. 461-476. DOI:10.1007/978-3-642-00493-3_22.

Kalaidjian, E. & Robinson, S.-a. 2022. Reviewing the nature and pitfalls of multilateral adaptation finance for small island developing states. *Climate Risk Management.* 36:100432. DOI:https://doi.org/10.1016/j.crm.2022.100432.

Kassam, A., Friedrich, T. & Derpsch, R. 2019. Global spread of Conservation Agriculture. *International Journal of Environmental Studies.* 76(1):29-51. DOI:10.1080/00207233.2018.1494927.

Keith, D.A., Ferrer-Paris, J.R., Nicholson, E. & Kingsford, R.T. 2020. *The IUCN Global Ecosystem Typology 2.0: Descriptive profiles for biomes and ecosystem functional groups.* Gland, Switzerland: IUCN. Available: https://portals.iucn.org/library/sites/library/files/documents/2020-037-En.pdf [12.04.2022].

Kubiszewski, I., Marais, C. & Costanza, R. 2017. Investing in ecological infrastructure in South Africa. *Ecosystem Services.* 27:A1-A2. DOI:https://doi.org/10.1016/j.ecoser.2017.07.009.

Lavorel, S., Colloff, M.J., McIntyre, S., Doherty, M.D., Murphy, H.T., Metcalfe, D.J., Dunlop, M., Williams, R.J. et al. 2015. Ecological mechanisms underpinning climate adaptation services. *Global Change Biology.* 21(1):12-31. DOI:https://doi.org/10.1111/gcb.12689.

Leach, M., Reyers, B., Bai, X., Brondizio, E.S., Cook, C., Díaz, S., Espindola, G., Scobie, M. et al. 2018. Equity and sustainability in the anthropocene: A social-ecological systems perspective on their intertwined futures. *Global Sustainability.* 1. DOI:10.1017/sus.2018.12.

Mackinnon, J., Andriamaro, L., Rambeloson, A., Razafindrazakasoa, M. & Harvey, C. 2017. Costs of delivery approaches for providing livelihood projects to local communities as part of REDD+ programmes: An analysis from Madagascar. *Environmental Conservation.* 45:1-9. DOI:10.1017/S0376892917000571.

Mander, M., Jewitt, G., Dini, J., Glenday, J., Blignaut, J., Hughes, C., Marais, C., Maze, K. et al. 2017. Modelling potential hydrological returns from investing in ecological infrastructure: Case studies from the Baviaanskloof-Tsitsikamma and uMngeni catchments, South Africa. *Ecosystem Services.* 27:261-271. DOI:https://doi.org/10.1016/j.ecoser.2017.03.003.

Mauri, M., Elli, T., Caviglia, G., Uboldi, G. & Azzi, M. 2017. RAWGraphs: A Visualisation Platform to Create Open Outputs. In Proceedings of the 12th Biannual Conference on Italian SIGCHI:28:21–28:25. Available: https://doi.org/10.1145/3125571.3125585.

Mbopha, M.S., Marais, C., Kleynhans, T.E. & Esler, K.J. 2021. Unlocking and securing ecological infrastructure investments: The needs and willingness to invest and institutional support mechanisms used. *South African Journal of Science.* 117(9-10):37-45. DOI:10.17159/sajs.2021/8666.

McDermott, M., Mahanty, S. & Schreckenberg, K. 2013. Examining equity: A multidimensional framework for assessing equity in payments for ecosystem services. *Environmental Science & Policy.* 33:416-427. DOI:https://doi.org/10.1016/j.envsci.2012.10.006.

Midgley, S.J.E., Esler, K.J., Holden, P.B., Rebelo, A.J., Stuart-Hill, S.I., Cullis, J.D.S. & Methner, N. 2021. Typologies of collaborative governance for scaling nature-based solutions in two strategic South African river systems. *Ambio.* 50(8):1587-1609. DOI:10.1007/s13280-021-01531-z.

Muzirambi, J.M., Musavengane, R. & Mearns, K. 2019. Revisiting devolution in community-based natural resources management in Zimbabwe: Towards inclusive governance approaches. In *Natural Resources, Tourism and Community Livelihoods in Southern Africa:*

Challenges of Sustainable Development. 1st ed. M.T. Stone, M. Lenao and N. Moswete, Eds.: Routledge. DOI:https://doi-org.ezproxy.uct.ac.za/10.4324/9780429289422.

Nakashima, D., Rubis, J.T. & Krupnik, I. 2018. Indigenous Knowledge for Climate Change Assessment and Adaptation: Introduction. In *Indigenous Knowledge for Climate Change Assessment and Adaptation.* D. Nakashima, I. Krupnik and J.T. Rubis, Eds. Cambridge: Cambridge University Press. 1-20. DOI:DOI: 10.1017/9781316481066.002.

Ndlovu, N.P. & Borrass, L. 2021. Promises and potentials do not grow trees and crops. A review of institutional and policy research in agroforestry for the Southern African region. *Land Use Policy.* 103:105298. DOI:https://doi.org/10.1016/j.landusepol.2021.105298.

Nehren, U., Sudmeier-Rieux, K., Sandholz, S., Estrella, M., Lomarda, M. & Guillén, T.e. 2014. *The Ecosystem-based Disaster Risk Reduction Case Study and Exercise Source Book*. Available: https://postconflict.unep.ch/publications/DRR_CASE_STUDIES_&_EXERCISES.pdf [14.07.2021].

Nel, J.L., Le Maitre, D.C., Roux, D.J., Colvin, C., Smith, J.S., Smith-Adao, L.B., Maherry, A. & Sitas, N. 2017. Strategic water source areas for urban water security: Making the connection between protecting ecosystems and benefiting from their services. *Ecosystem Services.* 28:251-259. DOI:https://doi.org/10.1016/j.ecoser.2017.07.013.

Nhamo, G. 2014. Addressing women in climate change policies: A focus on selected east and southern African countries. *Agenda.* 28(3):156-167. DOI:10.1080/10130950.2014.946734.

Nkambule, N.P., Blignaut, J.N., Vundla, T., Morokong, T. & Mudavanhu, S. 2017. The benefits and costs of clearing invasive alien plants in northern Zululand, South Africa. *Ecosystem Services.* 27:203-223. DOI:https://doi.org/10.1016/j.ecoser.2017.04.011.

Noble, I.R., Huq, S., Anokhin, Y.A., Carmin, J., Goudou, D., Lansigan, F.P., Osman-Elasha, B, Villamizar, A. 2014. *Adaptation needs and options. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom and New York, NY, USA: C.U. Press.

O'Connor, T.G., Puttick, J.R. & Hoffman, M.T. 2014. Bush encroachment in southern Africa: changes and causes. *African Journal of Range & Forage Science.* 31(2):67-88. DOI:10.2989/10220119.2014.939996.

OneEarth. 2020. Trees as Nature-Based Solutions: A Global South Perspective. *One Earth.* 3(2):140-144. DOI:https://doi.org/10.1016/j.oneear.2020.07.008.

Pascual, U., Phelps, J., Garmendia, E., Brown, K., Corbera, E., Martin, A., Gomez-Baggethun, E. & Muradian, R. 2014. Social Equity Matters in Payments for Ecosystem Services. *BioScience.* 64(11):1027-1036. DOI:10.1093/biosci/biu146.

Pretty, J. 2018. Intensification for redesigned and sustainable agricultural systems. *Science.* 362(6417):eaav0294. DOI:10.1126/science.aav0294.

Reason, C.J.C. 2017. *Climate of Southern Africa.* Oxford University Press.

Rebelo, A.J., Holden, P.B., Esler, K. & New, M.G. 2021. Benefits of water-related ecological infrastructure investments to support sustainable land-use: a review of evidence from critically water-stressed catchments in South Africa. *Royal Society Open Science.* 8(4):201402. DOI:doi:10.1098/rsos.201402.

Riccioli, F., Fratini, R., Marone, E., Fagarazzi, C., Calderisi, M. & Brunialti, G. 2020. Indicators of sustainable forest management to evaluate the socio-economic functions of coppice in Tuscany, Italy. *Socio-Economic Planning Sciences.* 70:100732. DOI:https://doi.org/10.1016/j.seps.2019.100732.

Roberts, D., Boon, R., Diederichs, N., Douwes, E., Govender, N., McInnes, A., McLean, C., O'Donoghue, S. et al. 2012. Exploring ecosystem-based adaptation in Durban, South Africa: "learning-by-doing" at the local government coal face. *Environment and urbanization.* 24(1):167-195. DOI:10.1177/0956247811431412.

Robinson, L.W., Eba, B., Flintan, F., Frija, A., Nganga, I.N., Ontiri, E.M., Sghaier, M., Abdu, N.H. et al. 2021. The Challenges of Community-Based Natural Resource Management in Pastoral Rangelands. *Society & Natural Resources.* 34(9):1213-1231. DOI:10.1080/08941920.2021.1946629.

Roe, D., Turner, B., Chausson, A., Hemmerle, E. & Seddon, N. 2021. *Investing in nature for development: do nature-based interventions deliver local development outcomes?* London. Available: https://pubs.iied.org/20206iied [15.03.2022].

Roe, S., Streck, C., Pritchard, L. & Costenbader, J. 2013. *Safeguards in REDD+ and Forest Carbon Standards: A Review of Social, Environmental and Procedural Concepts and Application*. Available: https://www.climatefocus.com/sites/default/files/safeguards%20-%20paper%203.pdf [15.04.2022].

Roser, M. & Ortiz-Ospina. 2019. *Global Extreme Poverty.*

Ruggiero, P.G.C., Metzger, J.P., Reverberi Tambosi, L. & Nichols, E. 2019. Payment for ecosystem services programs in the Brazilian Atlantic Forest: Effective but not enough. *Land Use Policy.* 82:283-291. DOI:https://doi.org/10.1016/j.landusepol.2018.11.054.

Savvidou, G., Atteridge, A., Omari-Motsumi, K. & Trisos, C.H. 2021. Quantifying international public finance for climate change adaptation in Africa. *Climate Policy.* 21(8):1020-1036. DOI:10.1080/14693062.2021.1978053.

Schreckenberg, K., Franks, P., Martin, A. & Lang, B. 2016. Unpacking equity for protected area conservation. *Parks (Northwood, London, England).* 22(2):11-26. DOI:10.2305/IUCN.CH.2016.PARKS-22-2KS.en.

Seddon, N., Chausson, A., Berry, P., Girardin, C.A.J., Smith, A. & Turner, B. 2020. Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Philosophical Transactions of the Royal Society B: Biological Sciences.* 375(1794):20190120. DOI:doi:10.1098/rstb.2019.0120.

Seddon, N., Smith, A., Smith, P., Key, I., Chausson, A., Girardin, C., House, J., Srivastava, S. et al. 2021. Getting the message right on nature-based solutions to climate change. *Global Change Biology.* 27(8):1518-1546. DOI:10.1111/gcb.15513.

Senganimalunje, T.C., Chirwa, P.W. & Babalola, F.D. 2015. Potential of institutional arrangements for sustainable management of forests under co-management with local forest organisations in Mua-Livulezi Forest Reserve, Mtakataka, Malawi. *The International Forestry Review.* 17(3):340-354. Available: http://www.jstor.org.ezproxy.uct.ac.za/stable/43739858 [2022/06/07/].

Shackleton, S., Masterson, V., Hebinck, P., Speranza, C.I., Spear, D. & Tengö, M. 2019. Editorial for special issue: "Livelihood and landscape change in Africa: Future trajectories for improved well-being under a changing climate". *Land (Basel).* 8(8):114. DOI:10.3390/land8080114.

Sheppard, J.P., Bohn Reckziegel, R., Borrass, L., Chirwa, P.W., Cuaranhua, C.J., Hassler, S.K., Hoffmeister, S., Kestel, F. et al. 2020. Agroforestry: An Appropriate and Sustainable Response to a Changing Climate in Southern Africa? *Sustainability.* 12(17):6796. Available: https://www.mdpi.com/2071-1050/12/17/6796.

Steffen, W., Richardson, K., Rockström, J., Cornell, S.E., Fetzer, I., Bennett, E., Biggs, R. & Vries, d.W. 2015. Planetary boundaries: guiding human development on a changing planet. *Science (American Association for the Advancement of Science).* 347(6223):1259855-1259855. DOI:10.1126/science.1259855.

Syampungani, S., Chirwa, P.W., Akinnifesi, F.K. & Ajayi, O.C. 2010. The Potential of Using Agroforestry as a Win-Win Solution to Climate Change Mitigation and Adaptation and Meeting Food Security Challenges in Southern Africa. *Agricultural Journal.* 5:80-88. DOI:10.3923/aj.2010.80.88.

Taylor, M., Eriksen, S., Vincent, K., Brooks, N., Scoville-Simonds, M. & Schipper, L. 2022. *Putting 'vulnerable groups' at the centre of adaptation interventions by promoting transformative adaptation as a learning process*. Norway. Available: https://kulima.com/wp-content/uploads/2022/04/NORAD-putting-vulnerable-groups-at-the-centre.pdf [24.05.2022].

Taylor, R. 2009. Community based natural resource management in Zimbabwe: the experience of CAMPFIRE. *Biodiversity and Conservation.* 18(10):2563-2583. DOI:10.1007/s10531-009-9612-8.

TESNbS. 2021. *Towards Equitable and Sustainable Nature-based Solutions*. Available: http://www.acdi.uct.ac.za/towards-equitable-and-sustainable-nature-based-solutions-tes-nbs [Available: http://www.acdi.uct.ac.za/towards-equitable-and-sustainable-nature-based-solutions-tes-nbs, 21.07.2021].

TESNbS. 2022. *Towards Equitable and Sustainable Nature-based Solutions (TES NbS)*. Available: https://sites.google.com/view/tesnbsworkshop/home?authuser=1 [Available: https://sites.google.com/view/tesnbsworkshop/home?authuser=1, 06.06.2022].

Thierfelder, C., Chivenge, P., Mupangwa, W., Rosenstock, T.S., Lamanna, C. & Eyre, J.X. 2017. How climate-smart is conservation agriculture (CA)? – its potential to deliver on adaptation, mitigation and productivity on smallholder farms in southern Africa. *Food security.* 9(3):537-560. DOI:10.1007/s12571-017-0665-3.

Trisos, C.H., Adelekan, I.O., Totin, E., Ayanlade, A., Efitre, J., Gemeda, A., Kalaba, K., Lennard, C. et al. 2022. *Africa (Chapter 9) in Climate Change 2022: Impacts, Adaptation,*

and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Available: https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Chapter09.pdf [**03.06.2022**].

Trogrlic, R.S., Duncan, M., Wright, G., van den Homberg, M., Adeloye, A. & Mwale, F. 2022. *Why community-based disaster risk reduction fails to learn from local knowledge? Experiences from Malawi*. U.N.O.f.D.R. Reduction.

Tschakert, P., van Oort, B., St. Clair, A.L. & LaMadrid, A. 2013. Inequality and transformation analyses: a complementary lens for addressing vulnerability to climate change. *Climate and development.* 5(4):340-350. DOI:10.1080/17565529.2013.828583.

UN. n.d. *The Sustainable Development Goals*. Available: https://sdgs.un.org/goals [Available: https://sdgs.un.org/goals, 10.07.2021].

UNEP. 2021. *United Nations Environment Programme: Adaptation Gap Report 2020*. Nairobi. Available: file:///Users/andreacampbell/Downloads/AGR2020.pdf [10.07.2021].

UNFCCC. 2014. *Key decisions relevant for reducing emissions from deforestation and forest degradation in developing countries (REDD+)*. Available: https://unfccc.int/files/land_use_and_climate_change/redd/application/pdf/compilation_redd_decision_booklet_v1.1.pdf [06.06.2022].

Viviroli, D., Dürr, H.H., Messerli, B., Meybeck, M. & Weingartner, R. 2007. Mountains of the world, water towers for humanity: Typology, mapping, and global significance. *Water resources research.* 43(7):W07447-n/a. DOI:10.1029/2006WR005653.

Viviroli, D., Kummu, M., Meybeck, M., Kallio, M. & Wada, Y. 2020. Increasing dependence of lowland populations on mountain water resources. 10.5167/uzh-191384. DOI:10.5167/uzh-191384.

WB. 2018. *Rural Population (% of total population): World Bank staff estimates based on the United Nations Population Division's World Urbanization Prospects: 2018 Revision.*

WWF. 2000. *Stakeholder Collaboration: Building Bridges for Conservation*. Washington D.C.

Xie, H., Zhang, Y., Zeng, X. & He, Y. 2020. Sustainable land use and management research: a scientometric review. *Landscape Ecology.* 35(11):2381-2411. DOI:10.1007/s10980-020-01002-y.

Zafra-Calvo, N., Pascual, U., Brockington, D., Coolsaet, B., Cortes-Vazquez, J.A., Gross-Camp, N., Palomo, I. & Burgess, N.D. 2017. Towards an indicator system to assess equitable management in protected areas. 10.1016/j.biocon.2017.05.014. DOI:10.1016/j.biocon.2017.05.014.