



Department of
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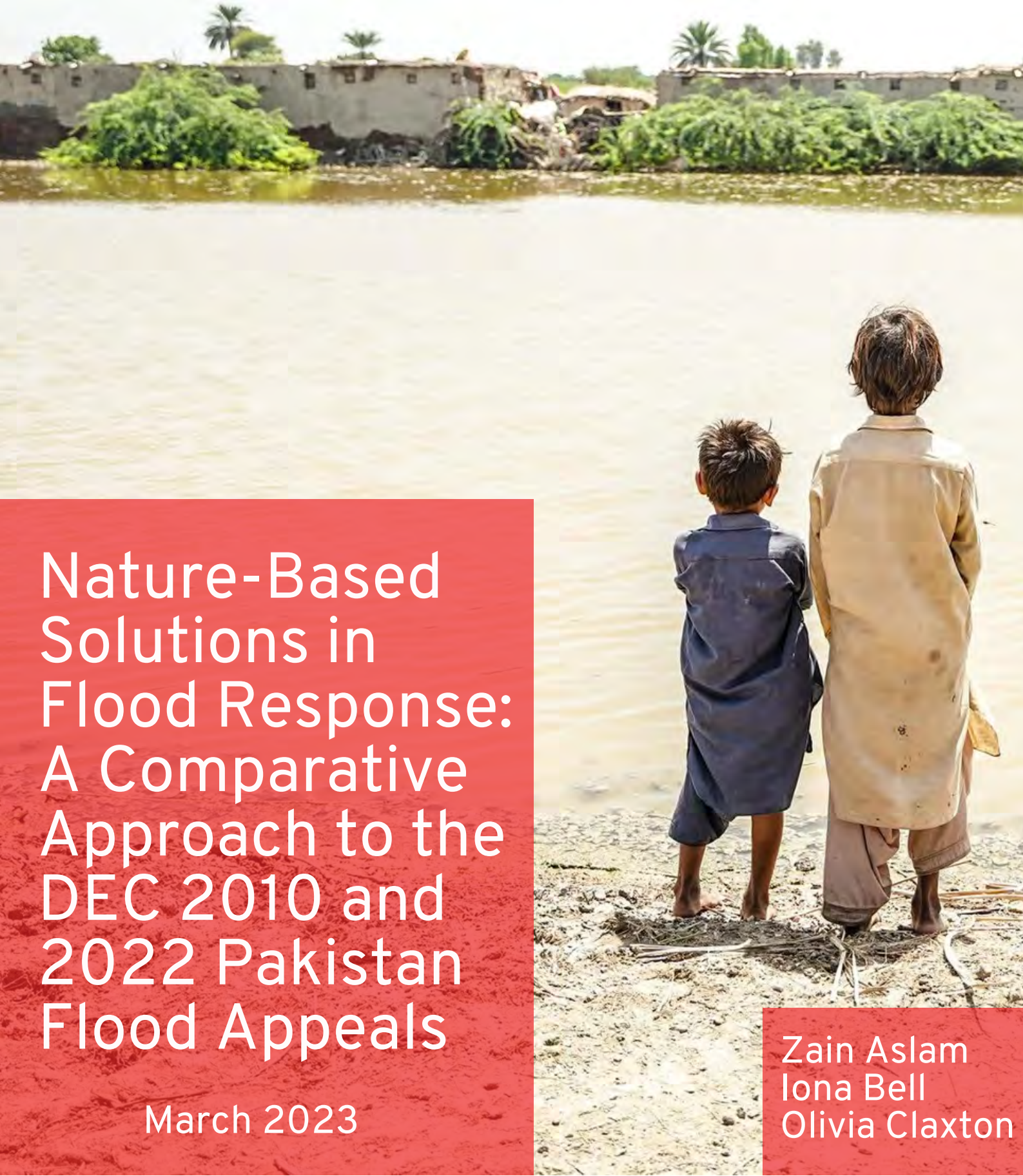


**DISASTERS
EMERGENCY
COMMITTEE**

Nature-Based Solutions in Flood Response: A Comparative Approach to the DEC 2010 and 2022 Pakistan Flood Appeals

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Zain Aslam
Iona Bell
Olivia Claxton



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Cover photo reference: Islamic Relief Pakistan (2022)

Abbreviations

BDRP: Building Disaster Resilience Programme

CAFOD: Catholic Agency for Overseas Development

CBO: Community Based Organisations

CFE-DMHA: Centre for Excellence in Disaster Management and Humanitarian Assistance

CSA: Climate Smart Agriculture

CSO: Civil Society Organisations

CDBRM: Community-Based Disaster Risk Management

CWSA: Community World Service Asia

DEC: Disasters Emergency Committee

DRM: Disaster Risk Management

DRR: Disaster Risk Reduction

EPA: Environmental Protection Agency

FCDO: Foreign Commonwealth and Development Office

FRM: Flood Risk Management

GFC: Green Climate Fund

GoP: Government of Pakistan

HAI: Help Age International

HRI: Human Resilience Index

IRP: Islamic Relief Pakistan

IUCN: International Union for Conservation of Nature TBTP = Ten Billion Tree Tsunami Programme

NDMA: National Disaster Management Authority

NDMP: National Disaster Management Plan

NFRCC: National Flood Response Coordination Centre

OPA: Older People Associations

PDNA: Post-disaster Needs Assessment

PDMA: Pakistan's National Disaster Management Authority

RDF: Research and Development Foundation

RNA: Rapid-Need Assessments

WB: World Bank

WWF: World Wide Fund For Nature

Working Definitions

Nature-based Solutions:

The working definition for NbS is that of the IUCN (2020), which outlines these as “actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature”.

Resilience:

The academic definition of resilience used is that of “the capacity of a system to absorb and recover from the occurrence of a hazardous event” (Gaillard, 2010, p.21).

Knowledge Repertoires:

Knowledge repertoires are used to describe entities which contain an extensive source of knowledge and information on the topic. This ranges across a diverse set of actors, including research institutions, international organisations, local and national government agencies, and civil society organisations.

Discursive Toolkit:

A discursive toolkit is understood as a conceptual mechanism - a label - through which the implementation of NbS gains access to a network of information, funding, support, and recognition. It connects local implementation with a supportive infrastructure to facilitate the use of NbS at a greater scale, including all disaster appeal phases.

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Executive Summary

Both the 2010 and 2022 floods in Pakistan have painted a devastating picture of the future, particularly anticipating increasing frequency and intensity of extreme weather events due to climate change and Pakistan's vulnerability profile built on multi-hazard exposure and rural agricultural dependence. This unfolds in a globally unequal balance in which the communities facing the most damage are those who have contributed the least to carbon emissions. Given this high-risk context, nature-based solutions (NbS) pose a unique opportunity for flood risk mitigation by integrating ecosystem-based approaches with societal challenges, benefiting both people and nature with the acknowledgement that they are both one and the same. NbS for flood recovery and prevention include floodplain management, water retention measures, and agricultural strategies. This report seeks to question the presence of NbS among DEC member charities throughout the 2010 and 2022 Pakistan flood appeals to suggest pathways for future implementation.

Findings:

This report paired interviews with DEC member charities and external informants with desk-based research to consolidate the presence of NbS throughout the 2010 and 2022 floods. It finds three central components determining the presence and success of NbS for flood management in Pakistan: a focus on building resilience; knowledge of NbS and the institutional environment.

First, it considers resilience as the theoretical entry point through which long-term mitigation approaches can be implemented in emergency response.

Interviewees explored the concept of resilience as an entry point through which recovery and rehabilitation can allow the implementation of NbS as long-mitigation strategies.

Community resilience is central to disaster risk management (DRM), proving to be both a nature-based solution and essential for the successful implementation of these while demonstrating the deep interconnectedness between nature and livelihoods. On one hand, communities provide contextualised environmental knowledge valuable for DRM. On the other, the level of acceptance dictates the success of NbS strategies. One example of NbS for community resilience is climate-smart agriculture, a series of agricultural methods aligned to climate change strategies. These are particularly relevant given Pakistan's rural agricultural profile.

Challenges for implementing resilience include competing with resources for immediate relief, a disconnect between reported and implemented programmes, and Pakistan's multi-hazard profile.

Secondly, knowledge is a crucial component for the successful implementation of NbS approaches to flooding. The report has found that knowledge repertoires are disconnected from NGOs, creating fragmentation between existing research and implementation. The knowledge repertoires exist but are currently siloed, impacting their mobilisation. Barriers to implementing knowledge surrounding NbS include the disconnect between research and implementation, lack of funding and resources, and willingness.

Increased knowledge on NbS can counter power asymmetries, which at present are restricting organisations, local partners and local communities from participating in NbS practices.

Identified knowledge repertoires with empirical knowledge of NbS are outlined in Appendix 1.

Lastly, the institutional and funding environment is central to the success of NbS. Between 2010 and 2022 in Pakistan, multiple factors have limited this, including global geopolitical and economic factors resulting in a greater paucity of funding for DEC members in Pakistan, the absence of the UN cluster system and a shrinking humanitarian space in Pakistan since 2010.

Additionally, while the government has increased its commitments to NbS since 2010, inadequacies in operationalisation and financing have persisted. Since 2010, DEC members have bolstered their emphasis on partnerships and localisation to utilise local capacities and indigenous knowledge to optimise NbS implementation.

The main organisational challenges DEC members face for NbS implementation include government willingness, funding, and insufficient collaboration with other stakeholders.

Ultimately, this research reveals that the main challenge for the implementation of NbS for disaster resilience in Pakistan is the disconnect between knowledge repertoires and implementing institutions

Drawing on these key findings the research offers the following recommendations:

Recommendations:

1. **Knowledge sharing platform:** create a collaborative knowledge platform to overcome the gap between knowledge reservoirs and implementing organisations, allowing for evidence-based humanitarian and development programmes. This should seek to connect member charities, governmental authorities, research institutions, and local knowledge.

2. **Standardised terminology:** Work towards mainstreaming NbS as a discursive toolkit, which will prove to be essential in increasing the effectiveness of NbS implementation.
3. **Build-back-better:** Take advantage of the DEC's Phase 2 to implement long-lasting recovery and rehabilitation, specifically focusing on community inclusion to build resilience through NbS livelihood approaches such as climate-smart agriculture.
4. **Organisational focus:** Strengthen **institutional capacity by** implementing measures for localisation via CBDRM programs and collaborative-decision making via long-term capacity building of local NGOs. Additionally, advocate to mainstream NbS in the government, address insecure land rights in partnership with provincial authorities and attempt to mobilise governmental incentivising schemes.

These recommendations are outlined in Section 7.

1. Introduction

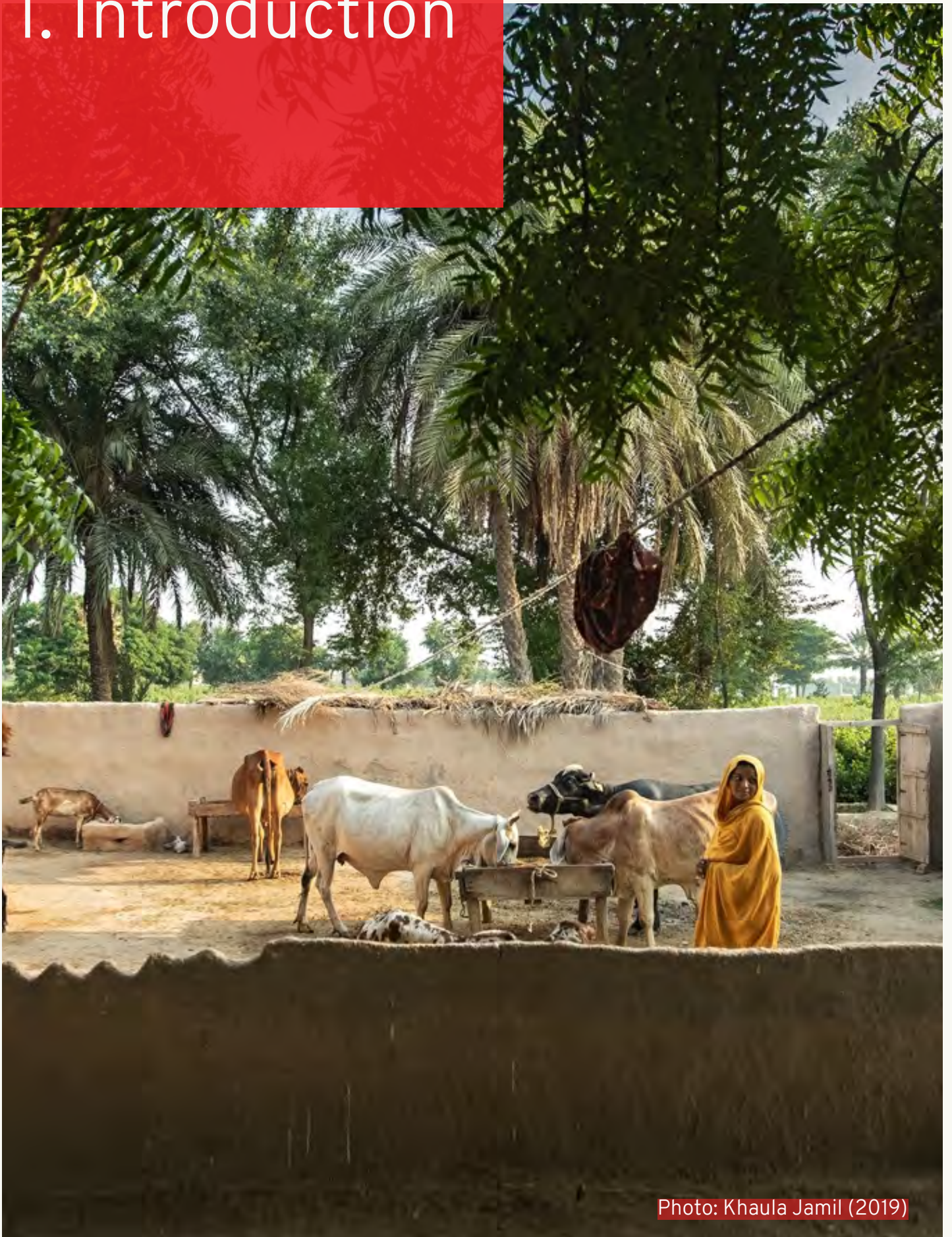


Photo: Khaula Jamil (2019)

1. Introduction

The 2022 floods in Pakistan have shown the scale of damage to be anticipated from future climate-related disasters, requiring an urgent focus on mitigating these given their increasing frequency and intensity due to climate change (Wisner, 2003). Pakistan is disproportionately affected by climate change, as the country produces less than 1% of greenhouse gas emissions annually (Devi, 2022). This has been recognised with the Pakistani-led creation of the Loss and Damage fund at COP27, through which climate polluting countries have been called to pay compensation for climate induced damage in developing countries (ibid). Within this, recognising the need to protect and restore ecosystems is essential to minimise population risk and damage (IUCN, 2022). Central to an environmental approach to disaster risk management (DRM)¹ is the use of nature-based solutions (NbS): “actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature” (IUCN, 2020). These contribute to risk mitigation and preparedness and are a central link between vulnerable communities and the ecosystems they depend on.

The Pakistani context is specifically apt for NbS implementation, as the nation ranks 5th most affected by natural hazards (Ahmed, 2022a) and 90% of the population is exposed to floods (Tariq & van de Giesen, 2012; Haider, 2006). This is of particular relevance for Pakistan, as the country’s agricultural profile creates a heightened dependence on environmental resources, where 70% of Pakistan relies on land for agriculture and livestock and 95% of flood-affected areas are agricultural, exacerbating inequities where

¹ DRM is used as best aligned to Pakistan's National Disaster Management Authority (PDMA).

the poorest population live in the most flood-prone areas (Qasim et al., 2015; Rana & Routray, 2016). NbS, which can work to mitigate environmental hazards through targeted approaches such as water retention measures and floodplain management, are thus well adapted to Pakistan's multi-hazard profile, in which the country is exposed to cyclical patterns of monsoon-intensified floods, glacial melt, droughts, earthquakes, and cyclones.

1.1. Pakistan Floods and DEC Appeals: 2010 and 2022



WHAT IS THE DEC

The Disasters Emergency Committee (DEC) brings together 15 leading UK humanitarian aid charities, raising funds to respond to overseas disasters quickly and effectively. It has deployed two appeals to address flood recovery in Pakistan, in both 2010 and 2022. 12 of these are currently operating in Pakistan in response to the 2022 floods. These relief operations are conducted through a multi-phased approach, as outlined below:

PHASE 1: FIRST 6 MONTHS

Phase 1 provides immediate, life-saving relief to affected populations. In the Pakistan flood responses, this included temporary shelter, WASH facilities, and the delivery of food and non-food items (NFIs), among others.

PHASE 2: FURTHER 18-30 MONTHS

Phase 2 focuses on the recovery, rehabilitation, and reconstruction of communities following a disaster. In Pakistan, this has covered agricultural assistance, capacity building and training, and awareness building.

Pakistan's flood hazard is concentrated along the Indus River basin, accumulating flash floods in densely populated plains and riverbank erosion in the elevated planes of the lower Indus. Despite similar geographical concentrations, the main difference between the 2010 and 2022 floods is the sheer magnitude of the floods, as shown in Figure 1.

Floodwater Extent in Pakistan: 2010 and 2022 Floods

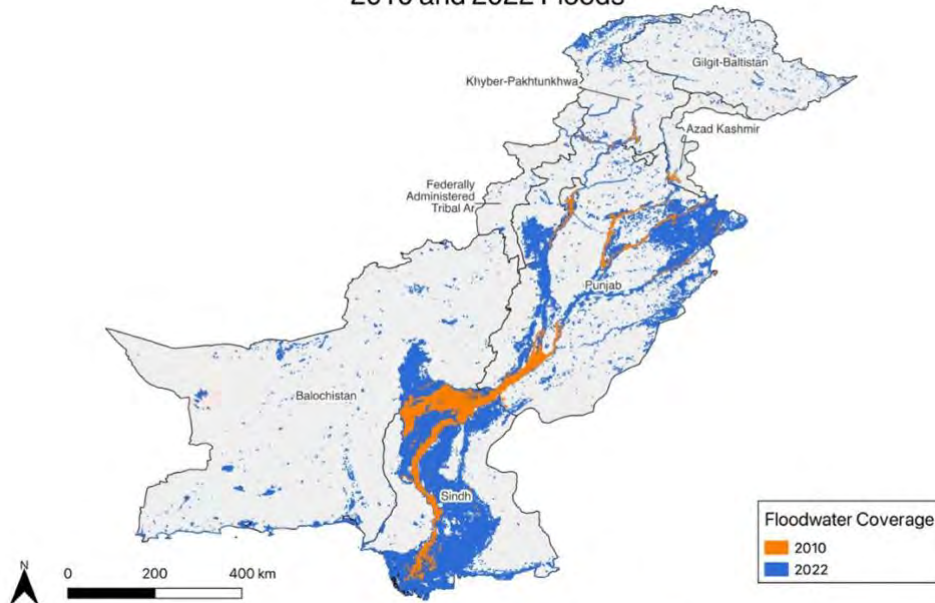


Figure 1: Floodwater coverage in 2010 and 2022. Data: UNITAR, 2022. Source: Researchers' own.

The 2010 floods were caused by rainfall 180% above average (Oxley, 2011), causing 1985 deaths and affecting 20 million people (FFC, 2010; Mian, 2014). Starting in the northern Indus basin, the flood slowly travelled south, allowing time for early warning systems and reservoir implementation (Oxley, 2011; Darosh et al., 2010). The UN cluster system was deployed, and the DEC appeal raised £71 million for disaster relief activities.

The 2022 floods, however, have been the worst since 1961, with a third of the country underwater, and rainfall levels 243% above average (Tanoue et al., 2021). 1,739 lives have been lost and 33 million people affected (UNICEF, 2023). Starting September 2022, the DEC appeal has raised £46.5 million, while the floodwater is still receding. The slow recession of water has created a cumulative impact on food security, malnutrition, disease, disruption of jobs, and interruption of harvesting seasons (UNOCHA, 2023). The UN cluster system was not deployed and, 10 months on, humanitarian efforts are ongoing, focusing primarily on dewatering for food security (ibid.).

Pakistan Flood Hazard and 2022 Flood Extent

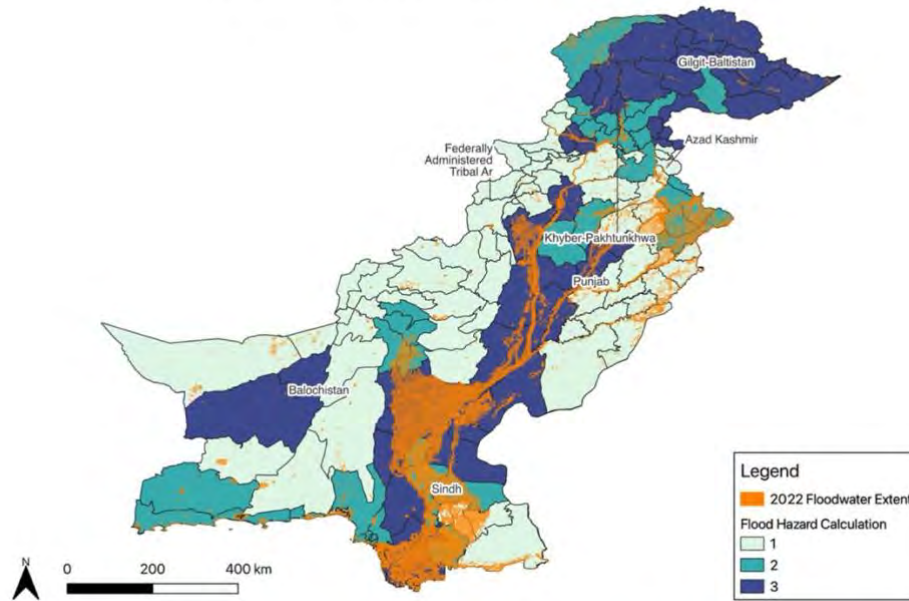


Figure 2: Flood risk calculations (1: lowest, 3: highest) and 2022 floodwater extent. Data: NDMA, 2017; UNITAR, 2022. Source: Researcher's own.

The evident question is why, despite forecasting flood risk levels (Figure 2), the gravity of the 2010 floods did not enact sufficient mitigation measures to anticipate future floods. Notably, NbS are well-positioned to address mitigation and risk reduction needs, posing a unique opportunity for both social and environmental benefits, including community wellbeing. This report therefore seeks to explore changes to flood risk management in Pakistan since 2010 and, more specifically, the use of NbS, to explore how to best implement these to mitigate future disasters. It addresses the following research questions:

- 1. Since the 2010 floods in Pakistan, what have we learned about best practices and nature-based solutions for flood recovery and prevention that can be applied to the current 2022 floods or elsewhere?*
- 2. Specifically, what environmental approaches have lessened the impacts of the 2022 floods?*

This research reveals that the main challenge for the implementation of NbS for disaster resilience in Pakistan is the disconnect between knowledge repertoires and implementing institutions, as shown in Figure 3.



Figure 3: NbS Implementation in Pakistan: Resilience and the Disconnect Between Knowledge and Institutions

To explore this, the report first establishes its methodological approach, followed by an overview of NbS. Then, it considers three core themes surrounding NbS in the DEC's Pakistan flood responses. First, resilience is explored as an entry point for the integration of NbS in emergency responses. Second, it reveals existing NbS knowledge repertoires in Pakistan and their discursive framing. Third, it identifies institutional environments as a central challenge for NbS implementation, situated in global geopolitics. The report concludes by recommending a collaborative knowledge platform to overcome the gap between knowledge reservoirs and implementing organisations.

2. Methodology



Photo: Concern (2023)

2. Methodology

This report uses a case-study approach for an in-depth, comparative analysis of the role of NbS in the 2010 and 2022 Pakistan floods, using primary and secondary qualitative data (Baxter, 2010; Aitken, 2008). It focuses specifically on the 2010 and 2022 DEC Pakistan Floods appeals through its member charities and partner organisations in Pakistan.

2.1. Data Sources

The research used both interviews and desk-based research to address our research questions. Interview candidates were identified and selected through our client and the DEC Environment Working Group, to whom we had the opportunity to present our research to, which enable us in sourcing further contacts. We then used a snowball sampling approach to obtain additional references.

In total we conducted twelve semi-structured interviews, with nine representing seven different DEC member charities and their partner organisations, and two external interviewees to contextualise the work (Table 1). We also conducted a systematic review of grey and academic literature related to NbS, floods in Pakistan, and DRM more broadly.

Table 1: DEC member charities and partners interviewed.

Organisation	Interviews Conducted
<i>DEC Member Charities</i>	
Care UK	1
Concern Worldwide	1
Help Age International (HAI)	2
International Rescue Committee (IRC)	2
Islamic Relief Pakistan (IRP)	1
Oxfam	2
<i>External Agencies</i>	
Research and Development Foundation (RDF), Pakistan	1
Community World Service Asia (CWSA): Implementing partner for Catholic Agency for Overseas Development (CAFOD)	1
Niaz Murtaza (Author of the 2010 and 2022 DEC Pakistan Evaluations)	1

2.2. Limitations

The report considers the following limitations. First, the research was sensitive given the ongoing 2022 DEC Pakistan appeal, limiting the availability of member charities and excludes analysis of the DEC’s ongoing Phase 2 response. Second, we consider its transferability and generalisability, which nevertheless remain relevant to inform NbS approaches for DRM. Finally, we have questioned our own positionality, aware of the postcolonial implications of studying Pakistan from the UK, thus centring the voices of local interviewees and academics. Here, we analyse the social context of interviews (Hitchings and Latham’s, 2019), noting our position associated with the DEC as a funding body to consider donor-receiver power dynamics and the positionality of interviewees as individuals or organisational representatives.

3. Overview of NbS

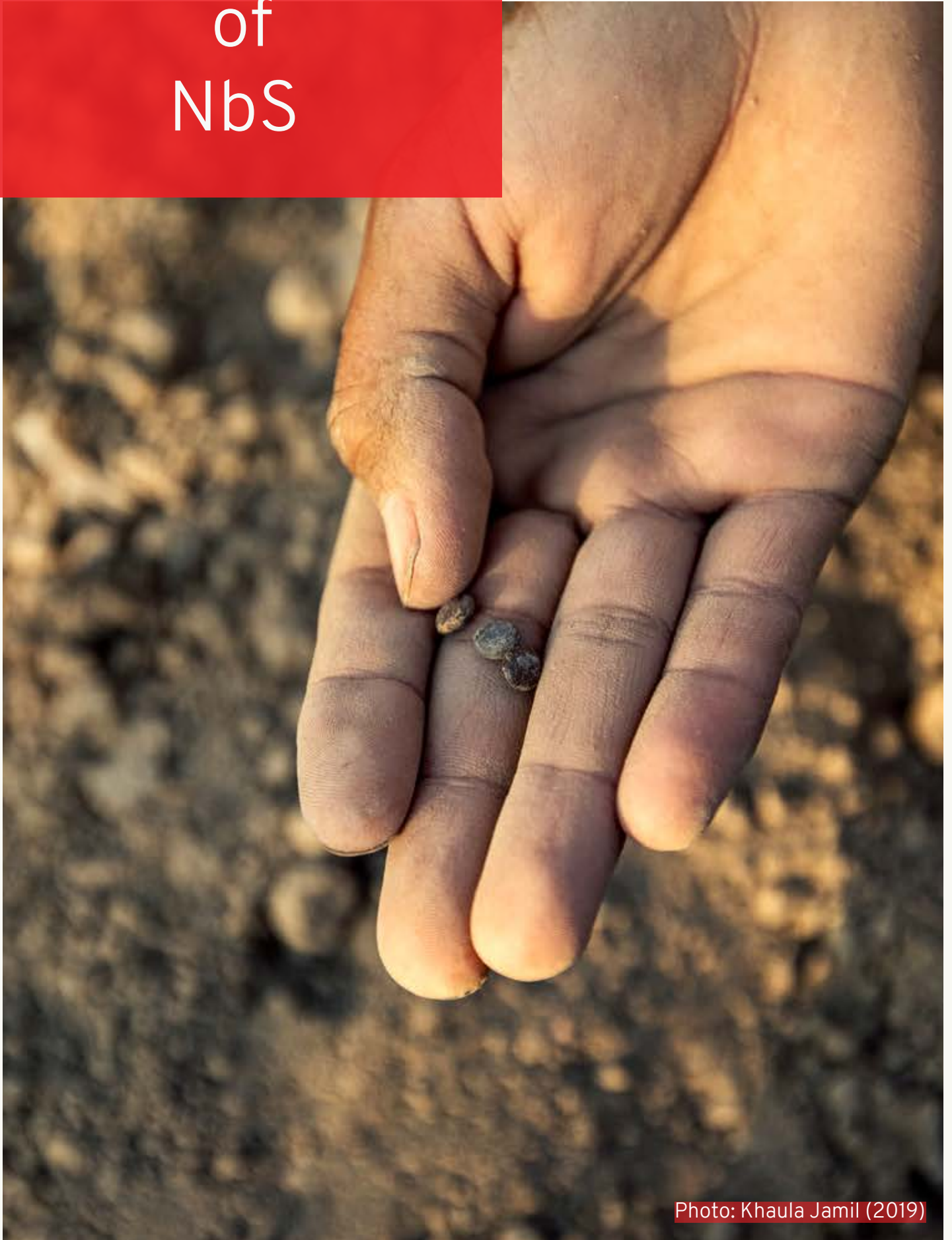


Photo: Khaula Jamil (2019)

3. Overview of Nature-Based Solutions

This report builds on the International Union for Conservation of Nature (IUCN) (2020) definition of NbS as strategies which manage ecosystems to address societal challenges to benefit both people and nature. These challenges include climate change, carbon sequestration, biodiversity loss, water and food security, and erosion control (Deng et al., 2016; Shah et al. 2019), thus fundamentally connected to disaster risk. As such, NbS are uniquely placed to address the anticipated 150 million people that will need humanitarian assistance for floods, droughts, and storms by 2030 (IFRC, 2022).

3.1 Historical Development

NbS are rooted in 20th century conservation movements. In the 1970s, traditional engineering shifted to the inclusion of the environment, recognising the ties between community development and resource management (Cassin, 2021). In the 1990s, ecosystem services gained momentum, considering the human advantages of the environment, such as water, air, and climate regulation (ibid.).

The term NbS was first coined by the World Bank (WB) and the IUCN in the late 2000s (Pauliet et al., 2017). Since, it has been established as a toolkit to address complex global and local challenges, including climate change adaptation and mitigation, biodiversity conservation, and socioeconomic development. Despite a consensus around these early conceptualisations of NbS, the term remains ambiguous, with multiple interpretations (Sowinska-Swierkosz and Garcia, 2022).

Despite a consensus around these early conceptualisations of NbS, the term remains ambiguous, with multiple interpretations (Sowinska-Swierkosz and Garcia, 2022) **and critiques (see section 3.5).**

3.2. Nature-based Solutions for Flood Risk Management

NbS are becoming increasingly popular for their multiple benefits, from mitigating climate change and improving biodiversity to increasing economic benefits and enhancing community resilience (FAO, 2011). Notably, NbS present viable solutions to countering disasters as they restore natural systems and habitats, reducing both hazards and vulnerabilities (IFRC, 2022). They can mitigate floods by reducing riverine water, slowing water flow, and storing water in natural landscapes (European Commission, 2015). One example is that of green infrastructure, a cost-effective, sustainable alternative to traditional grey infrastructure (IFRC, 2022; SDG 10), such as arboreal avenues, parks, sustainable drainage systems, and wetlands, all of which facilitate DRM (Gearey, 2018). Additionally, it is important to highlight that NbS go beyond technological interventions, additionally encompassing local knowledge - grounded in contextualised environmental knowledge, and community networks which promote flood risk reduction and encourage recovery (IFRC, 2022). Examples of NbS for flood risk management are extracted in this research to identify scalable solutions (see Table 2).

Some examples of NbS are outlined in Kumar et al. (2020) analysis of the operationalisation of NbS within Open Air Laboratories (OAL) in which scientific expertise is coupled with local knowledge for monitoring, evaluating and implementing NbS in response to flooding. Successful examples on the use of OAL's within NbS projects are currently recognised in Europe within flood prone areas, such as the Stere Ellada region in Greece which faces flooding in the Spercheios catchment (ibid). These examples present how NbS are becoming a globally recognised remediation strategy in response to flooding.

3.3. Nature-based Solutions and Livelihoods

NbS are central to livelihood maintenance. These provide food sources while protecting biodiversity, water security, human health and wellbeing, absorbing atmospheric carbon, and enhancing the health of ecosystems (IFRC, 2022; Hartmann et al., 2019), upholding both ecological and social systems (Egli et al., 2009). For example, Pretty (2008) explores the advantages of NbS to small-holder farmers for conserving and increasing organic soil matter, crop productivity, and production stability. Strategies of crop diversification, intercropping, and crop rotation subsequently reduce agricultural costs (Tengo & Belfrage, 2004). NbS also has the potential to make crops resilient to climate change while ensuring higher yields (Branca et al. 2013; FAO, 2011). For instance, while temperature rise and irregular rain patterns damage agricultural productivity (ibid.), NbS like agroforestry and integrated crop management reduce heat stress on agriculture, making soil more fertile and productive and providing socioeconomic progress (FAO, 2011; Branca et al., 2013).

3.4. Institutional Arrangements for Nature-based Solutions: Systems Thinking

Using NbS to mitigate climate damage requires international-level technical and financial support, national policies and frameworks, multi-sectoral planning, coordination, and investment in monitoring and evaluation (IFRC, 2022). These need to be coupled with local stakeholder engagement for successful implementation, as communities consolidate local knowledge into NbS execution, facilitating their management and integrating socioeconomic development.

As such, a “systems perspective” (Huidobro, 2015, p.568) is essential to integrate NbS with landscape management and spatial planning to manage disaster risk (Holstead et al.,

2015). Stakeholder contributions are therefore essential, wherein policymaker, researcher, practitioner, and community willingness are a requirement to enact monitoring systems, build capacity among practitioners, and establish regulatory frameworks and institutional support as underlying institutional mechanisms for NbS success (IFRC, 2022). Only then can NbS be successful as opportunities for flood mitigation (Chiu, Raina & Chen, 2021).

Raising awareness of the economic benefits of NbS to government stakeholders incentivises their implementation. Namely, NbS can provide protection against the economic costs of climate change, estimated to save at least US\$104 billion in damages and create 350,000 jobs by 2030 (IFRC, 2022). Therefore, NbS are evidenced to be strategic and holistic, but their success is determined by their enabling environment.

3.5. Nature-based Solutions Critiques

NbS are not without critics. First, NbS implementation can affect populations differentially, highlighting the importance of equitable and participatory decision-making processes. For instance, despite the local benefits of green spaces in urban areas - including mental and physical health, reducing pollution, and increasing social contact, other communities might not benefit if these green places are financially or geographically inaccessible (Gearey, 2018). Therefore, NbS require a critically inclusive approach that criticises underlying structures, including state-society relations.

Furthermore, NbS initiatives remain small-scale and project-based, thus facing challenges such as land acquisition and quantification struggles (IFRC, 2022). The long-term and uncertain nature of NbS exacerbate challenges of locational decisions, institutional settings, availability of resources, and land and physical capability (Raska et al., 2022). Dressler et al. (2010) outline how competing political and managerial interests hinder the

development of NbS, resulting in a lack of long-term monitoring and maintenance, limited knowledge and expertise, and high costs within limited budgets (IFRC, 2022). These poor regulatory frameworks and lacking institutional support challenge NbS implementation, fuelling uncertainty about its effectiveness (ibid.).

The theoretical development of NbS highlights their potential to mitigate future disasters. As such, this report builds on academic literature to evaluate the presence of NbS in and between the 2010 and 2022 DEC Pakistan flood appeals.

Against its ambiguous backdrop, a growing body of literature has explored how the narratives surrounding NbS can re-produce long standing power dynamics, excluding historically marginalised actors (Woroniecki, 2020). Survival International (2023) touch on this, highlighting that some carbon offsetting measures have become falsely labelled as NbS within attempts at rebranding controversial carbon-colonialist projects. In reality, many NbS projects do not address the root, underlying drivers of climate change, including extensive greenhouse gas emissions or the exploitation of the global commons by profit-maximising corporations (ibid). However, carbon offsetting measures, that often include mass evictions of marginalised local groups, have become recognised as NbS (ibid). It is therefore crucial when using NbS to observe all epistemologies that have contributed to its universal definition and ensure that it is not applied recklessly, as NbS alone will not address the climate crisis (ibid).

4. Resilience- Building as an Entry Point for NbS



Photo Adam Cohn, Flickr (2020)

4. Resilience-Building as an Entry Point for NbS

The sheer intensity of the 2022 floods have highlighted diminished reservoirs of resilience in Pakistan, requiring a focus on sustainable recovery. Mainstreaming NbS is essential to address flood risk mitigation, as 70% of the population, and more than 95% of the flood-affected population (HAI, 2023), depends on rural agriculture (IRP, 2023), therefore crucial for individuals and the country's economy (Darosh et al., 2010).

In the first six months of the 2022 DEC funded appeal response, there has been limited scope for the inclusion of long-term and nature-oriented solutions given its emergency relief focus. However, to best to mitigate the damages of future floods in Pakistan's multi-hazard and vulnerability context, mitigation is increasingly necessary to anticipate future relief efforts and reduce costs of damage recovery (Tanoue et al., 2021).

The concept of resilience, as a theoretical framework, can be seen as beneficial in bridging long-term development with short-term humanitarian relief, acting as an entry point through which to implement NbS. Academically, resilience is understood as "the capacity of a system to absorb and recover from the occurrence of a hazardous event" (Gaillard, 2010, p.21), and by practitioners as "the ability of communities to predict a disaster, prevent disasters, move away from disasters, and then recover from disaster", built into pre-, during-, and post-disaster phases (Murtaza, 2022). DEC agencies have operationalised resilience as a discursive toolkit throughout their appeals and in external work outside of these, which serves to promote a larger timeframe focused on root causes of risk and vulnerability and ensuring sustainable recovery. As outlined by Murtaza (2023), the DEC provides funding for emergency and early recovery work, not

long-term development, wherein DRM and resilience work can be seen as a link between the two.

The scale of destruction in 2022 highlighted external processes which construct vulnerability. Despite claims that resilience and disaster risk management strategies have evolved since 2010 (HAI, 2023; Murtaza, 2023), interviewees revealed that, beyond the unprecedented magnitude of the 2022 floods, lessons learnt from 2010 have not been sufficiently implemented to anticipate future flooding. Pakistan's changing flood hazards, moving from riverine to increasing glacial melt and exacerbating monsoon floods due to climate change (Rajput and Chaudhry, 2022), posits an increasing urgency for environmental mitigation through NbS.

4.1. Timing

Despite using resilience as a point of entry through which to implement NbS as long-term mitigation, DEC members involved in the 2022 appeal were clear that there is limited space for environmental approaches in the DEC's Phase 1 as the focus is principally on life-saving operations and emergency relief (HAI, 2023). The environmental considerations in Phase 1 focused on minimising immediate impacts through waste management, reducing the use of plastics, and controlling groundwater contamination. However, there was criticism of extensive plastic waste due to tarps (RDF, 2023). Furthermore, multiple agencies outlined agricultural modality efforts aligned with climate change (provision of seeds to restart income-generation (Concern Worldwide, 2023), irrigation rehabilitation, training, reforestation) in Phase 1 Reports. However, interviews revealed that such approaches could not always be implemented as floodwater had not yet receded (Concern Worldwide, 2023).

The DEC's Phase 2, however, has more potential for NbS as agencies focus on rehabilitation, through which livelihoods are re-established and reconstruction can be focused on long-term mitigation. These approaches align with the "window of opportunity" disaster approach, through which the disruption of the status quo make change possible (Cretney, 2017; 2019; Oliver et al., 2013). As such, member charities should, where possible, focus Phase 2 to align with long-term mitigation and preparedness, including the direct implementation of NbS, particularly where they are sustainable alternatives to reconstruction and provide short-term benefits. In doing so, agencies can mobilise resilience as a bounce forward to transformation, as opposed to a bounce back to the status quo (Manyena et al., 2019) - actions often operationalised as *build-back-better* (Manyena, 2006; Gaillard, 2007). Scholars remain critical of resilience and build-back-better approaches as these are easily co-opted to devolve responsibility (Ruszczuk, 2019). Recovery should therefore incorporate NbS, including traditional irrigation and flood watershed systems, agricultural training, and reforestation as livelihood investments.

In 2010, and more strongly in 2022, DEC agencies operationalised resilience within their appeals and in their daily work. Notably, resilience was used as an umbrella term to incorporate long-term risk and vulnerability reduction into reconstruction approaches, mainly through livelihood development approaches. Similarly, agencies use resilience to recognise the inherent capacities of communities in their ability to recover from disasters, in a process which seeks to empower populations rather than operationalising programmes as service provision to passive victims.

There is an implicit understanding among members that risk reduction occurs in a "continuum" (HAI, 2023) through which root causes of vulnerability require a pre-disaster focus on mitigation (CWSA, 2023), aligned with scholarly suggestions to coexist with water

cycles and nature (Gearey, 2018). Pre-2022 resilience approaches were operationalised through DEC-member charities’ development work, laying the backdrop for livelihood-oriented relief and reconstruction efforts. Among these, multiple livelihood programmes were recognised for improving resilience in the 2022 floods, although not explicitly identified as NbS (Table 2). The 2022 DEC appeal-funded response (DEC, 2023) included – in both Phase 1 and 2 - tree planting programmes (HAI), reconstruction of band or lath irrigation structures (AAH), agricultural community-based disaster risk management (CBDRM) programmes (Concern Worldwide), and advocacy programmes (Islamic Relief Worldwide). These employ livelihood approaches to increase community resilience, integrating agricultural training and landscape reconstruction to mitigate future disasters. However, some of these strategies were not supported in interviews, begging the question of the gap between project planning and legitimate implementation, to be addressed through monitoring and evaluation mechanisms.

[Table 2. Resilience-Building Projects in Pakistan \(DEC, 2023; Inyatullah, 2020\).](#)

Project	Description	Actors
NbS		
Tree planting in Phase 2.	Anticipated tree-planting with communities to mitigate environmental damage.	IRW; AAH; Help Age; Save; Tearfund Obtained from Phase 2 reports. Funded by DEC.
Band/lath irrigation reconstruction.	Rebuilding traditional irrigation mechanisms (spate) which use flood water for longer-term irrigation through water channels and reservoirs. <i>Not mentioned in interviews.</i>	AAH Obtained from Phase 1 reports. Funded by DEC.
<u>NbS included in national NDC action plan (GoP, 2021).</u>	Government funded NbS programmes.	Government of Pakistan.
Community Resilience as NbS		

<p>Implementation of CBDRM in flood-prone areas.</p>	<p>Building community resilience through agricultural training and equipment, CSA, saving grains and livestock, information distribution, early warning systems, and response/evacuation coordination. Implemented with local communities and DRM authorities.</p> <p>Targeted 1325 farmers in Rajanpur over 5 years.</p>	<p>Concern</p> <p>Obtained from Phase 1 reports.</p> <p>Funded by FCDO.</p>
<p>Building Disaster Resilience in Pakistan (BDRP) (Inayatullah, 2020)</p>	<p>Holistic resilience-building in communities targeting vulnerable communities and groups in livelihood, shelter, and WASH sectors in response to the 2010 floods.</p> <p>While IRC claimed it increased resilience to the 2022 floods through knowledge and equipment, Oxfam, who were also involved in the project, were more critical of the project's impact.</p> <p>Successful practices are shared with partners for replication.</p>	<p>Concern</p> <p>IRC</p> <p>ACTED</p> <p>Funded by FCDO and UKAID.</p>
<p>Voices Organised for Climate Change Advocacy and Lobbying (VOCAL).</p>	<p>Integrated interventions to raise awareness, build local capacities, and prepare local communities for environmental hazards, climate change impacts, and resilience.</p> <p><i>Not mentioned in interviews.</i></p>	<p>IRW</p> <p>Obtained from Phase 2 reports.</p> <p>Funded by DEC.</p>

4.2. Community Resilience and Livelihood Approaches

DEC member charities are committed to community inclusion for decision-making, since community acceptance is essential for the successful adoption, implementation, and continuation of initiatives, a point maintained by members and back-up by literature (Raska et al., 2022; IRP, 2023). For example, agroforestry was rejected by a rural village that instead burnt the trees for agricultural land (HAI, 2023). On the other hand, community resilience can also be seen as a nature-based solution in itself, where it enhances disaster risk management (Oxfam, 2023), and since humans are also part of socio-ecological systems (Berkes & Folke 2003). Models of NbS account for wellbeing and social capital alongside nature (Akbar and Aldrich, 2017), building on lived experiences of climate phenomena. This includes rich local knowledge on flood risk, through which communities can facilitate hazard mapping (CWSA, 2023). In this sense, the community scale is most appropriate to address the interconnectedness of human and environmental wellbeing, building on localisation for sustainable mitigation, response, and preparedness through local capacities and knowledge (Oxley, 2011; HAI).

One example of community resilience as a NbS is HAI's operationalisation of Community Based Disaster Risk Management through community-based organisations (CBOs), known as "older people associations" (OPA), as a model through which to conduct risk management. These groups are trained for aid implementation to categorise vulnerabilities and respond to needs, promote local knowledge, mobilise community ties, and therefore take immediate action to mitigate local hazards (HAI, 2023). Frequent consultations ensure the success of local OPA interventions. Strong community coordination and bonding for social capital and knowledge are essential for immediate and long-term disaster response (Ullah et al., 2021).

Another important consideration in CBDRM is that of gender inclusion and participation. While gender-sensitive approaches were recognised as beneficial for both gender

equality and the implementation of NbS, strategies for doing so require further research, programming, application, and support.

NbS Strategies for Resilience-Building: The Example of Climate-Smart Agriculture

Pakistan's hazard and vulnerability profiles make livelihood approaches central to community resilience as rural agricultural and livestock dependence is devastated by floods, requiring immediate action for food security, health and wellbeing, and ecosystem stabilisation (Rajput and Chaudhry, 2022).



*The livelihood sector is Pakistan's most vulnerable to
climate change (RDF, 2023)*



The most prevalent livelihood-influenced NbS among DEC member charities was climate-smart agriculture (CSA). Thoroughly researched in Pakistan (ie. Saddique et al., 2022) and invoked among think tanks, universities, and INGOs, this method mainstreams climate responsiveness into agricultural production (CIAT et al., 2017) and facilitates livelihood adaptation to specific ecosystems (IRP, 2023). By streamlining contingency planning, CSA engages farmers as agents of change for cost-effective disaster mitigation and preparedness (Concern Worldwide, 2023; RDF, 2023).

Table 3. Climate Smart Agriculture Strategies (DEC, 2023).

CSA Strategies	
Strategy:	Implemented by:
Soil management and stabilisation (ie. salinity and waterlogging)	RDF Help Age Concern
Water management, reservoirs and storage (ie. rainwater harvesting)	IRW: Drip or pitcher irrigation in water-scarce areas, tunnel farming to maintain moisture (Baluchistan) *AAH: Traditional band/laths for spate irrigation (land levelling, dikes) *Age *IRW: watershed management
Agricultural and adaptation capacity building/training	Tearfund *BRC *Tearfund *IRW
Agroforestry (IFRC, n.d.; Shah et al., 2019)	Concern Help Age
Technological developments	RDF *AAH
Activism and knowledge sharing with experts	IRW
Flood-resistant crops and deed species specific to ecological zones for most-climate resilient (ie. not cereal or sugar cane)	IRW *AAH *Age
Environmentally friendly fertilisers (DAP - diammonium phosphate)	*Age *Tearfund *AAH
Seed storage	*IRW
*These projects were anticipated in Phase 1 reports, but not discussed in interviews. Data obtained from DEC Phase 1 reports.	

CSA is only explicitly labelled in Tearfund and Islamic Relief Pakistan (IRP) approaches, but the approaches are streamlined throughout agricultural strategies carried out by DEC member charities in 2022. These include soil and water management, agroforestry, and agricultural capacity building, among others (Table 3). Strategies such as land use management, tree planting, and livelihood diversification have long been used by farmers, but are rarely recognised as NbS (Saddique et al., 2022; Ahmed, 2022a). This shows how CSA is a historical and ongoing example of successful NbS for flood mitigation through livelihood integration for community resilience.

4.3. Challenges to Resilience-Building as an Entry Point for NbS

The Temporal Application of Resilience Approaches

The main challenge for the adoption of resilience building strategies is the temporal inconsistency between resilience-building and relief. Outside of long-term recovery efforts, humanitarian and development agencies require long-term funding to address the root causes of vulnerability to save lives in the future, beyond immediate emergency appeal funded responses. This also requires mitigating environmental degradation at the root, addressing deforestation, urbanisation, and infrastructural limitations to ecosystem services (Oxley, 2011).

While community-based disaster risk management provides a useful approach to implement NbS to benefit communities and the environment simultaneously, NbS should also be implemented in the interest of long-term mitigation outside of immediate benefits (Osti, 2022). As outlined by Murtaza et al., when reflecting on the 2010 DEC-funded response, “DRR work is mainly being done by agencies as part of emergency work.

CBDRM mostly focuses on avoidance and response and ignores Disaster Risk Reduction (DRR) prevention and mitigation dimensions” (2012, p.3). Additionally, multi-hazard and livelihood approaches require a more context-specific application of NbS, notably in the use of flood responses that are equally drought-sensitive. This adds further challenge to the implementation of NbS as they must be adapted to individual contexts rather than allowing large scale replication.

Resilience Programming

Resilience programming has revealed multiple discrepancies as an entry point for NbS. There is limited acknowledgement of NbS in resilience programming, even where present. For example, the use of local knowledge or agroforestry are not explicitly labelled as NbS and are therefore not signposted for targeted support or future replication.

Additionally, Murtaza et al. (2012) highlight that DRM programmes can sometimes reduce resilience by increasing exposure to hazards for the most vulnerable through the unequal co-option of resources and information through which non-elites are not granted access to NbS opportunities and benefits. Furthermore, an emphasis on commercial, large-scale agriculture may displace populations from their livelihood-dependent land for water management and drainage. These are often associated to large-scale development projects established within the conditionality of loans from large financial institutions, including the IMF (ibid.; Khan, 2002). In addition to undermining soil stability and floodwater retention capacities, these practices distance vulnerable communities from opportunities to implement and benefit from NbS, and imposes bureaucratic challenges of land ownership for their implementation of private land. Furthermore, such large-scale, monoculture farms impact soil stability, therefore increasing the risk of floods as water retention capacities are eroded.

4.4. Proposed Solutions and Recommendations

To address these challenges, building on post-2010 recommendations (Murtaza et al., 2012; Darosh, et al, 2010), the following steps are recommended:

DEC Phase 2: Early Recovery

Introduce NbS in DEC **Phase 2** at an operational level, focusing on “build-back-better” approaches for flood-resilient infrastructure (blue and green), water management, and land development, for example integrated watershed management.

Community Focus

Focus on the **role of community** to integrate NbS for resilience-building. For example, including local and context-specific environmental knowledge – including tree and seed species or harvesting patterns, and building local capacities for community-based disaster risk management for increased capacity in relief and reconstruction efforts, as well as prevention and mitigation. An inclusive and intersectional approach is required, particularly utilising the capital of youth who comprise 61% of the population (RDF, 2023), and paying particular attention to the need to implement gender-sensitive approaches.

Livelihood Approaches

Expand the integration of **livelihood approaches** in NbS. This includes micro-mitigation schemes (Murtaza et al., 2012) including agroforestry and climate-smart agriculture. Focus on **climate-smart agriculture** by implementing flood-resilient reconstruction and rehabilitation, green infrastructure, water management, and further agricultural foci. **Incentivise** NbS, including monetary and educational approaches, such as selling carbon credits for ecosystem services, or awareness raising to communicate the long-

term benefits of NbS (IRW, 2023). Furthermore, encourage livelihood **diversification** to minimise dependency in scenarios of large-scale agricultural damage.

Collaborative Communication

Operationalise communication with **implementing and academic institutions** to align engineered interventions with research (i.e. placement of riverine corridors and floodplains or use of irrigation techniques, Abbas and Hussain, 2019).

Accountability: Institutional and to Affected Populations

ensure agencies follow through on proposed plans through **monitoring and evaluation mechanisms**. Additionally, remain **critical** of projects which may make people more vulnerable, such as diverting water towards more exposed populations (Murtaza, 2023), requiring a focus on social power to address access to land and water (Mustafa, 2002) and for more legitimate solutions in context (Huidobro, 2015). To do so, promote **accountability** as a mechanism to ensure proposed resilience-building projects are implemented, monitored, and evaluated.

5. Knowledge



Photo: Khaula Jamil (2019)

5. Knowledge

Knowledge is a key component for the successful implementation of NbS for Flood Risk Management. This section therefore explores the how awareness of NbS impacts their mobilisation in Pakistan, evidencing where linkages and disjuncture's lie in applying lessons learnt.

5.1. Existing Knowledge Repertoires

National level

At the national level, the Government of Pakistan (GoP) are implementing seven NbS programmes, five of which were started in 2019 and two begun in 2020. The most notable project concerning our research is Recharge Pakistan (Table 4) which focuses on building climate resilience through adaption and floodwater management. It is the only project specifically focused on mitigating flood risk (GoP, 2021), and outlines a clear linkage between NbS and climate-resilient livelihoods through a CBDRM focus (FAO, 2011). Despite its flood risk management focus, Recharge Pakistan was not mentioned by DEC members or local partners during interviews, presenting a clear discrepancy between NbS knowledge repertoires and their deployment at the community level.

Table 4. Government of Pakistan Nature-based Solutions Programmes

Programme	Description
Ten Billion Tree Tsunami Programme (TBTP) 2019-2023	Four-year programme aimed at planting 3.29 billion plants over 1.2 million hectares. US\$125 million has been directed towards the project.
Recharge Pakistan (2019-in pipeline)	<p>Aims to build resiliency to climate change through NbS adaptation and flood risk management. The programme will identify vulnerable areas to flood risk, where NbS will be most effective.</p> <p>The project focuses on using floodwater to restore existing wetlands and recharge aquifers. Project has the potential to impact 10 million vulnerable people.</p> <p>Investment in project is set at US\$150 million, with US\$50 million requested from the Green Climate Fund.</p>
Eco-system Restoration Initiative (2019-2030)	Restoring degraded cropland, grassland, forest, and wetland for adaptation and mitigation.
Protected Areas Initiative (2020-23)	Expand coverage of protected areas from 12 to 15% of the total land area by 2023, at an estimated cost of Rs. 3.9 billion. The project will involve 15 new national parks covering 7,300 square kilometres.
Reduced Emissions from Deforestation and forest Degradation-Payments for Environmental Services (REDD+PES) (2020-49)	Protecting mangrove forests in Sindh and Baluchistan through new plantations over 16,552 ha for climate mitigation, biodiversity conservation and strengthening local livelihoods of fisheries and eco-tourism.
Miyawaki Forests (2019-ongoing)	Planting small urban forests to mitigate urban heat using native tree species that grow faster, sequester more carbon and are self-sustaining. 126 urban forests projects using the Miyawaki technique across the country.
Transforming the Indus Basin with Climate Resilient Agriculture and Water Management (2019-2026)	<p>US\$47.7 million project to disseminate information and utilise cutting edge technology to build the country's capacity to adapt to climate challenges in agriculture and water sectors.</p> <p>The project will aim to enhance farmers resilience through skill and capacity development.</p>
<i>Source: UNFCCC, 2021, p.39-41</i>	

Instead, the varying success of the Ten Billion Tree Tsunami Programme (TBTP) was mentioned during interviews by Help Age International, Community World Service Asia, and the International Rescue Committee. The project was praised internationally by experts as a leading example in conservation efforts for reducing soil erosion and loss (Qamer, 2022), and during interviews by Help Age International for its livelihood and learning opportunities (HAI, 2023). However, Help Age International also criticised the project for its use of absorptive eucalyptus trees, exacerbating drought conditions.

The Recharge Pakistan project report (GCF, 2019) discusses the impact of reduced expertise when implementing NbS for community resilience, stating that this limits GoP policies for Flood Risk Management (FRM), and that bridging this knowledge gap is crucial for mitigating large-scale impacts. These limitations are further recognised within communities' adaptive capacities, stating that there is a present lack of expertise on flood mitigation practices provided by NbS (ibid).

Unclear linkages between the role of NbS and community resilience and livelihoods are further reflected in the neglect of NbS within flood management programs. Despite discussing the need for resilient ecosystems in the face of climate change, the United States Department of Defence's organisation the Centre for Excellence in Disaster Management and Humanitarian Assistance (CFE-DMHA, 2021) do not recognise NbS as a flood prevention or management tool, showing clear gaps between Disaster Risk Management and NbS.

Organisational and Local Level

In the absence of globalised standards on NbS, DEC member charities displayed varying engagement with NbS terminology during interviews. Answers evidenced the contested inclusion of NbS within disaster risk management practices, as few organisations

associated the concept with flood prevention. Rather, engagement with the environment was discussed through sustainability practices, such as recycling, in DEC's Phase 1. Nevertheless, engagement with NbS was significant within discussions on programmes designed to increase community resilience, predominantly Climate Smart Agriculture.

The findings support emerging literature arguing for the importance of discursive framing around NbS (Melandis and Hagerman, 2022; Woroniecki, 2020). Ambiguity surrounding the concept of NbS can construct narratives that in turn reproduce long standing power dynamics and exclude historically marginalised actors (ibid). However, the framing of NbS as a technology or toolkit promotes Western-centric ideas of domination over nature, further limiting participation from local actors with opposing ideals (Melandis and Hagerman, 2022). The research has found that limited knowledge has restricted organisations from implementing NbS, evidencing the need to address this knowledge gap and question which epistemologies shape the concept.

5.2. Knowledge Production and Sharing Partnerships

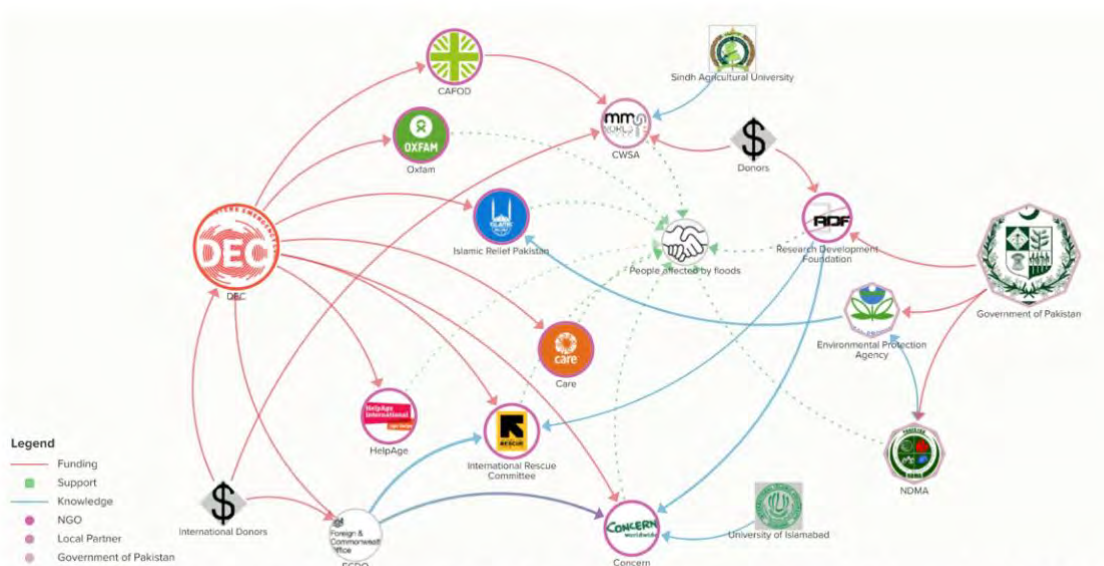


Figure 4: Pakistan's Institutional Ties, A Systems Map. Source: Researcher's own. Produced on Kumu.

Interviewees identified institutions and existing partnerships which facilitate the implementation of NbS in response to flooding in Pakistan, as shown in the Kumu systems map above depicting flows of funding, support, and knowledge between key actors in Pakistan's flood response below (Figure 4). Identified knowledge production and sharing partnerships are presented, including the power of each actor in decision making processes, represented by their varied size. The larger the actor, the more authority they have in Pakistan's flood response. The map also demonstrates where disconnect lies between actors. Islamic Relief Pakistan, Community World Service Asia (CAFOD's partner organisation), Concern Worldwide and the International Rescue Committee are the only DEC members identified in this research (and member partners) that are currently utilising knowledge centred partnerships with government ministries, universities, or the Foreign Commonwealth and Development Office (FCDO).

The Research and Development Foundation (RDF)

The Research and Development Foundation have a knowledge platform focused on increasing community resilience to flood risks, including NbS projects. Their projects build disaster resilience and adaptive capacities through training and learning incentives. During interviews, the Research and Development Foundation highlighted their engagement with NbS through projects centred on Climate Smart Agriculture (CSA), soil cultivation (for saline or water-logged soil), drought-resilient crops, rainwater harvesting and ground water management practices. A key point of interest is that the Research and Development Foundation successfully link NbS and livelihoods through training practices.

The Research and Development Foundation have partnerships with a range of INGOs, NGOs and government ministries, including DEC members, Concern Worldwide and International Rescue Committee. These partnerships were only highlighted by Research and Development Foundation, not the DEC members themselves, suggesting a

disjuncture between the Research and Development Foundation and institutions acting in isolation.

As a micro-level actor, the Research and Development Foundation play a key role as knowledge brokers in what Sarabi et al (2019) describes as diffusing knowledge among stakeholders to facilitate organisations in mainstreaming NbS practices.

The Environmental Protection Agency (EPA), Pakistan

At the national level, Pakistan's EPA is a key institution for NbS, falling under the GoP's Ministry of Climate Change, and associated with both Islamic Relief Pakistan and Help Age International (DEC, 2023; HAI, 2023).

EPA's partnership with Islamic Relief Pakistan has created a network to foster Climate Smart Agriculture (CSA) and water use practices. The impact of this alliance and its role in facilitating NbS for Islamic Relief Pakistan was stressed during interviews, particularly the potential to combine local and expertise knowledge for livelihood protection. Help Age International also partnered with EPA in Sindh for a tree planting program, which substantiated the potential of NbS for Flood Risk Management (FRM) initiatives throughout livelihood and crop initiatives.

Universities

Another large-scale partnership occurs between organisations and universities. Concern Worldwide and Community World Service Asia (CAFOD's partner organisation) highlighted the importance of academia focused partnerships for sharing expertise knowledge on best practices for NbS. Community World Service Asia explored their partnership with Sindh Agricultural University which provides vulnerable communities with insights on water scarcity, assisting select communities with resource mapping by

mobilising expertise to pinpoint exact water source locations. Additionally, Concern Worldwide partnered with Islamabad University for knowledge sharing on Climate Smart Agriculture practices. This allowed affected communities to learn about seed storage during heavy rains or flooding. Both Community World Service Asia and Concern Worldwide emphasised that the sharing of expertise through these education focused partnerships increased community resiliency.

International Rescue Committee does not currently have any academic partnerships but recognised their potential for using innovative technologies in rural communities, such as drones for seed planting.

The Foreign Commonwealth and Development Office (FCDO)

At an international level, both the International Rescue Committee and Concern Worldwide have an established partnership with the Foreign Commonwealth and Development Office (FCDO). Both organisations discussed in interviews about working with the FCDO's Building Disaster Resilience Programme (BDRP). The International Red Cross noted that the BDRP had provided expertise on drought resilient agricultural practices, such as seed diversification. The International Rescue Committee could then educate vulnerable communities on best practices for adaptive capacities. Concern Worldwide also outlined the success of the BDRP in training local communities on alternative livelihood practices, including flood-resilient crops. Both the International Rescue Committee and Concern Worldwide highlighted that the Human Resilience Index (HRI) improved in the provinces where the BDRP was implemented. During interviews it was said by both organisations that these communities displayed greater resiliency during the 2022 floods, through requiring less aid and assistance than others in their affected region.

5.3. Challenges to Implementing Knowledge for NbS

Knowledge on NbS within DRM in Pakistan exists (see Appendix 1), and partnerships between institutions and agencies are well-established. However, there is a structural disconnect between research and implementation. The report identifies the following barriers for implementing knowledge on NbS within DEC member agencies.

Funding

Without sufficient funding, organisations are limited in their ability to materialise existing knowledge on NbS to improve their resiliency to flooding (GoP et al., 2022). Community World Service Asia (CAFOD's partner organisation) stated that limited funding and resources inhibit NbS, particularly in learning and upscaling. Nearly all organisations interviewed highlighted that funding is the main barrier to implementing NbS.

Insufficient funding has long remained a challenge for NbS, as benefits from NbS are realised in the long term, but funding commitments are shorter (Sarabi et al, 2019). This presents the need to address funding disparities, further highlighted in the 2022 Post-Disaster Needs Assessment (PDNA) (GoP et al., 2022) calling for investment into NbS for resilience building purposes.

Willingness to fund and implement Nature-based Solutions

A key point of disconnect between existing research and projects implemented is willingness from actors to enact, engage and fund NbS in response to flooding. This finding is further also reflected in Ahmed's (2022a) research on the adoption of adaptative practices by farmers in Pakistan, where the uptake of adaptation measures was limited where farmers lacked knowledge and resources on adaptation options (ibid.).

Learning from the past can motivate effective up-take. However, if there is a lack of motivation to implement NbS, it is difficult to advance existing research beyond its symbolic recommendations.

Willingness must stem from all key stakeholders that hold power to implement change, including the GoP. One route to drive demand for research into the role of NbS in flood management is for it to become incentivised by political will, supported by an established and consistent funding stream. The need for NbS to be mainstreamed by all key actors is clear within the PDNA (2022). The report states that NbS are a key approach to addressing flooding and are essential for building long-term resilience (ibid).

5.4. Proposed Solutions and Recommendations

In response to the challenges presented to implement NbS successfully, the following solutions may assist DEC member charities in engaging and facilitating NbS programmes.

Knowledge Transfer Platform

The implementation of learnings from the GoP since the 2010 floods has been limited, presenting the need for a renewed and accountable approach to knowledge sharing. Existing knowledge on NbS remains largely academic, or recognised within institutional spaces, resulting in limited diffusion and acceptance at the local level (Sarabi et al, 2019).

In interviews, Oxfam proposed a **decentralised knowledge transfer platform**, led by national organisations, and separate from donor interests. This would promote local knowledge, experiences, and information sharing aligned with Pakistan's National Disaster Management Authority (NDMA) guidance for ease of implementation. The

platform would provide a space to share real time learnings on NbS for flood recovery and prevention. The main aim would be to enable stakeholders to engage with adaptive learning, blending scientific and local knowledge, and promoting collaborative decision making (Mian, 2014). This aligns with the PDNA's call for a national inventory for post-disaster learnings and increasing emphasis on the need to strengthen knowledge sharing at a national and sub-national level (GoP, 2021).

Standardising Knowledge and Information on NbS

Standardised terminology for NbS is essential to best learn from and implement programmes, incorporating both expertise and local knowledge to overcome power dynamics. Given the reliance on local actors for the long-term success of NbS, community engagement with the concept and its role in Disaster Risk Management is crucial for its effectiveness (Price, 2021).

Local Networks and Knowledge

At the local level, communities' livelihoods are determined by **contextual knowledge** and ownership of natural resources (Oxley, 2011).

☞☞ *Help Age International shared an anecdote of a village in Punjab, where an elderly member informed the village of indicators that had anticipated prior floods. Upon seeing these, the elder warned the village to evacuate, therefore saving the village through oral traditional knowledge. This case study presents the value of and need to empower local voices to lead the restoration and enhancement of their surrounding environment.*

☞☞

This was further evidenced by examples given in interviews of communities with strong local networks who were shown to be more resilient during the 2022 floods. These examples exemplify the crucial need to utilise scientific and local knowledge when designing, implementing, and maintaining NbS (Price, 2021).

Triple Loop Learning

In the aftermath of a disaster research has shown that adopting a **triple loop learning model** can ensure that learnings are implemented effectively and successfully. In particular, the triple loop learning model promotes a policy of accountable learning for generating a resilient system (Mian, 2014). Moving towards creating a resilient system on the ground in Pakistan will be crucial for DEC members and DEC partners within future flood responses. Mian (ibid) states that a triple loop learning focuses on correcting errors through designing “governance norms and protocols to foster changes in the governance system” (ibid., p.425). As a result, this report suggests that to successfully implement a triple loop model learning organisations should promote the following:

- Recognise learning as a key component for building resilience, with a specific focus on participation of marginalised actors coupled with collaboration across a range of expertise.
- Utilise adaptive learning strategies to blend multiple forms of knowledge and decision-making processes to achieve a system with high adaptability.
- Go beyond your organisation to bridge relationships with a wide range of stakeholders to facilitate an exchange of knowledge. This will in turn promote linkages and trust between local, national, and international actors which may assist in overcoming issues of coordination, accountability and implementation barriers (such as funding).

6. Institutions and Funding



Photo: Concern 2023

6. Institutions and Funding

Institutions and funding are essential for successfully implementing NbS practices for DRM. This section firstly considers the wider institutional & funding climate that interviewees outlined as significantly impacting NbS implementation in Pakistan. Secondly, this section highlights the institutional dynamics of DEC members and the Government of Pakistan since 2010 for NbS.

6.1. The Wider Institutional and Funding Climate

Global Geopolitical and Economic Climate

The 2010 DEC floods appeal raised a substantial total of £71 million (Murtaza et al. 2012). Despite the extent of the flooding being of larger magnitude in 2022 (Figure 1), there has been a greater paucity of funding for DEC members operating in Pakistan currently. The 2022 appeal currently stands at £46.5 million. The research has highlighted the geopolitical and economic dynamics shaping this significant difference in funding when comparing the 2010 and the 2022 appeals.

First, the 2022 Pakistan floods face greater competition for international funding due to increased needs deriving from several concurrent crises (Murtaza, 2023; IRP, 2023), including the Ukraine war. Second, the Russian invasion of Ukraine has resulted in inflated global commodity prices (Qureshi & Rana, 2022). Compounded by the economic fallout of the pandemic, rises in oil, natural gas, and wheat prices have escalated the cost of living in donor countries, including the UK, thus disincentivising donations (MCF, 2022).

Both factors have negatively impacted the funding available for DEC members and partners involved in the initial stage of the flood response and has ultimately hampered the potential to expand the scope for NbS for flood recovery and rehabilitation (HAI, 2023).

Compounded by the flood damage, commodity price rises have also contributed to a severe economic and food security crisis in Pakistan due to its high import-dependency for energy and wheat (Qureshi & Rana, 2022). The economic crisis is multi-dimensional, exacerbated by additional factors including political instability and the impact of the pandemic (ibid; Concern Worldwide, 2023). Consequently, DEC members and partners in Pakistan operate in an especially harsh economic climate. Interviewees highlighted that inflated market prices have hampered organisational capacity to build resilience and address food security (Murtaza, 2023). For example, Concern Worldwide suggested that purchasing various technologies and flood-resilient seeds for climate-smart agriculture has become financially troublesome (Concern Worldwide, 2023). Therefore, this poses a serious challenge to organisations seeking to engage with climate-smart agriculture as a NbS.

Regarding governmental economic constraints, high levels of public debt and subsequently stringent IMF conditions on public spending (Tamale, 2021) have hampered the Pakistani government's capacity to finance the development of NbS and strengthen flood resilience.

UN Cluster System

The global economic downturn, coupled with rising intensity and frequency of global crises, have hampered the UN's capacity to meet soaring global needs, with an estimated

shortfall of approximately \$32 billion (Ahmed, 2022b). Consequently, the UN cluster system was not activated in response to the 2022 floods, as had been in 2005 and 2010.

In 2010, the UN's cluster approach was deployed to facilitate the local and international humanitarian response and was praised for its success in flood response (ibid.). Overall, operational coordination was improved through data sharing between the government and clusters (Niaz et al., 2011). Additional Cluster Benefits included:

- a. Advocacy initiatives highlighted by affected populations and cluster participants.
- b. Increased monitoring and evaluation for cluster strategy and outcomes.
- c. Supported service delivery via a designated platform to settle on approaches and reduce duplication.

(UNOCHA, no date).

Therefore, interviewees identified the absence of the UN cluster approach in 2022 as a challenge for an integrated and comprehensive approach to the response (IRC, 2023; Murtaza, 2023). Organisations face reduced coordinative capacities, impacting resilience building and information sharing that could facilitate NbS . This has exacerbated the gravity of response, recovery and rehabilitation stages faced by the GoP and DEC members.

In 2022, the GoP led the response coordination, supported by relief organisations, including DEC members. However, the humanitarian regulatory environment has changed profoundly since 2010.

Shrinking Humanitarian Space in Pakistan

Humanitarian space for relief organisations in Pakistan has shrunk since 2010. Between 2010 and 2022, the government developed a regulatory regime with greater bureaucratic burdens, repressing civil society organisations (CSOs), and constraining humanitarian access through national security concerns (Murtaza, 2023; HAI, 2023). To exemplify this, Pakistan had 158 active international and national humanitarian organisations in 2010. However, in 2022, this number fell to 70 (Ahmed, 2022b).

Consequently, the shrinking humanitarian space has severely impacted long-term DRM approaches. In interviews, Murtaza (2023) highlighted that DRM initiatives that began after the 2010 floods lost momentum, as institutional arrangements and resources were weakened due to the regulatory crackdown. Initiatives included WASH schemes and agricultural livelihood projects (Murtaza et al., 2012) serving as small-scale NbS. As a result, "reservoirs of resilience", which may have mitigated the damage inflicted in 2022, were diminished (Murtaza, 2023).

6.2. Comparing the Institutional Environment: 2010 and 2022

The following section considers the institutional approaches of the Government of Pakistan and DEC members in response to the 2010 and 2022 floods. The comparison will highlight how institutional dynamics and arrangements have changed, and how these changes have affected the feasibility and implementation of NbS.

Government of Pakistan

2010

Post-2010 floods, the GoP recognised the need to bolster its commitment to strengthening DRM (GoP et al., 2022). The government's flood response was deemed "inadequate and inefficient" due to lacking resource allocation, reactive planning, coordination between provinces and governmental departments, local-level preparedness, and community involvement (Ahmed, 2022a). Consequently, the NDMA constituted the National Disaster Management Plan (NDMP) and National Flood Protection Plan IV to build the capacity to better prepare and respond to disasters. The NDMP explicitly outlined DRM strategies with a notable emphasis on CBDRM approaches (GoP, 2012). Nevertheless, implementation challenges were apparent, including the lack of financing and operationalisation (GoP et al., 2022), serving as barriers to facilitating NbS initiatives.

2022

In 2022, the GoP led the humanitarian response by initiating the National Flood Response and Coordination Centre (NFRCC). The NFRCC was established to coordinate action between the federal, provincial and military representatives, providing relief, logistical, search & rescue and engineering assistance (GoP et al., 2022). Nevertheless, the outcome of the 2022 floods has demonstrated that institutional arrangements initiated by the GoP since 2010 are insufficient in mitigating the unprecedented damage of the ongoing floods. Looking forward, the GoP recognises the need for NbS to strengthen DRM in Pakistan, "taking advantage of landscape features and ecosystems" (GoP et al., 2022, p 60.). Whether the government is committed enough to ensure this comes to fruition is yet to be seen.

DEC Members and Partners

2010

In 2010, DEC members responded through direct and partnered implementation, facilitating linkages between agencies and utilising the availability and expertise of local staff (Niaz et al., 2011). However, a key finding of the DEC's Evaluation Report (2011) was that the "space for synergies and collaboration [was] little explored" (ibid, p.8,9). Although the importance of localisation and collaboration was acknowledged, this did not always translate into practice, with the overall response "tending to overlook local knowledge, capacities and skills" (Doherty & Alexander, 2022). This ultimately resulted in poor sustainability and maintenance of project initiatives, impeding NbS practices for DRM.

2022

In the absence of the cluster system, DEC organisations have engaged their own institutional arrangements and partnerships to ensure effective relief coordination and local-level participation in the current response. Without the UN Cluster system, DEC members reflected on the need to increase organisational coordination on "program design, technical issues, joint programming, training and advocacy" (Murtaza et al., 2023, p.21). Working groups have replaced the clusters, frequently coordinating meetings on virtual platforms (DEC 2023). While DEC members have engaged in direct implementation, interviewees emphasised the greater role of partnerships with national and local partners, local staff and CSOs compared to 2010 (Concern Worldwide, 2023; Murtaza, 2023; HAI, 2023; Oxfam, 2023), shown in the devolution of service delivery (Figure 5; Appendix 2).

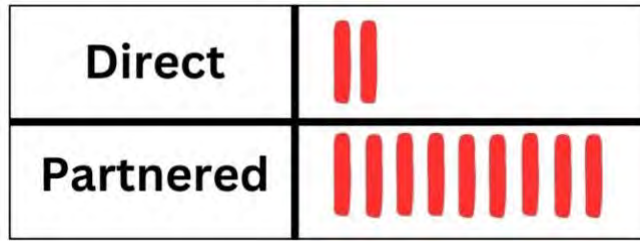


Figure 5: DEC Agency Service Provision (2022)

This networked approach arises from the recognised importance of partnerships and localisation post-2010. The significance of both has been exacerbated by the diminished humanitarian space in Pakistan since 2010. Integrating national and local partner organisations' knowledge of local context and community wisdom has been imperative in the 2022 flood response and will continue to be essential beyond the DEC's Phase 1 (DEC, 2023).

DEC Phase 1 Interim reports (2023) also suggest that DEC members are leveraging their institutional capacities to engage more comprehensively with community resilience and supporting village organisations (DEC, 2023). For example, HAI organised broad-based community meetings to leverage CBOs and local knowledge for Rapid-Need Assessments (RNA) (ibid.). This serves as a framework to include local communities in implementing and operationalising NbS. Furthermore, localisation has been paired with the expertise of environmental groups and provincial authorities for a more integrated NbS approach. Islamic Relief Pakistan highlights the potential for institutional linkages by "forging alliances and networks with environmental groups and provincial networks and at the local level to foster climate-smart land and water use practices, especially for the mitigation of floods through comprehensive watershed management." (IRP, 2023, p.18 in DEC, 2023).

6.3. Challenges to Institutions and Funding for NbS

Government Willingness and Funding

A fundamental challenge revealed in our research for NbS is funding. The GoP's funding for disaster preparedness is only 10% of all funds allocated to disaster management (HAI, 2022), outlining insufficient willingness of governmental institutions to promote NbS within NDMA commitments. These NDMA funds predominantly support grey infrastructure for urban populations and industrial activities (Bakhsh and Kamran, 2019), neglecting small-scale investments in agriculture. For example, vulnerable farmers cannot afford the 70-80K rupees required to prepare one acre of cropland, a crucial baseline for climate-smart agriculture and agricultural communities (Concern Worldwide, 2023). This is not financially feasible for many vulnerable farmers and agricultural communities, thus requiring the GoP to support, finance and subsidise localised NbS.

Collaboration

At present, neglecting institutional networks inhibits the feasibility of NbS, as they require structural changes to strengthen and facilitate their implementation, particularly regarding further spaces for knowledge sharing and bottom-up, localised approaches. This entails strengthening local leadership and including local communities with networks of authorities, local NGOs, CSOs, environmental groups, and universities to foster effective NbS implementation.

Land Rights

Land rights are a barrier to NbS implementation in Pakistan, as many rural small-holder farmers rely on insecure land rights and access (Gazdar & Naqvi, 2011), impeding their ability to implement NbS adaptation strategies such as climate-smart agriculture (Funder et al., 2022). Additionally, NbS initiatives can cause tensions due to conflicting stakeholder interests (ibid). However, both the 2010 and 2022 PDNA fail to provide a strategy for land rights (GoP et al., 2022; Gazdar & Naqvi, 2011), highlighting their continued neglect and positing them as a persistent challenge for NbS implementation.

6.4. Proposed Solutions and Recommendations

Greater Localisation and Collaborative Decision Making

Strengthening **institutional capacity** is essential for NbS. With greater emphasis on localisation in flood management, this requires DEC members to invest in long-term capacity building of local NGOs. This can ultimately strengthen collaborative capacities to facilitate NbS. To achieve this, members can increase coverage of local administrative costs, support salaries and benefits, and initiate greater leaderships for partners in varied programme functions (Murtaza et al., 2023).

To emphasise **localisation, participation** must remain critical to the governmental devolution of DRM to local scales to ensure legitimate inclusion and participation (Arnstein, 1969) rather than neglect (Chandler and Reid, 2016). This bottom-up engagement for NbS can be maximised through community institutionalisation and CBDRM models, which must account for lacking local engagement and participation in

provinces such as South Balochistan (Doherty & Alexander, 2022). This is especially important in Balochistan, a province which has developed grievances and experienced conflict regarding the state's expropriation of Balochistan's natural resources and the exclusion of Baloch ownership and participation in their own development decisions (Tariq, 2013). Therefore, NbS projects in Balochistan and beyond must incorporate provincial and local participation in order to avoid further potential points of conflict.

Advocacy

DEC member charities and partners must use institutional and **advocacy** capacities, alongside CSOs, to mainstream NbS as a co-benefiting, sustainable form of DRM (Murtaza et al., 2012; RDF, 2023). Strategic coalitions and campaigning can mobilise public opinion to incentivise NbS in government, allowing the GoP to act as an enabling entity for NbS and expand its commitment to climate change mitigation. This way, resources are more likely to be effectively channelled into scaling up NbS projects and bolstering their implementation, monitoring and evaluation in Pakistan.

Furthermore, advocacy must hold the key stakeholders accountable for addressing land-rights issues that flood-affected individuals and communities face. DEC members can provide technical support to the GoP to incorporate land needs assessments and address land inequalities (Gazdar & Naqvi, 2011).

National Financial Incentives and Assistance

In interviews, the IRC proposed **national incentives and funding** for NbS at a larger scale, where DEC members could serve as a bridge between the GoP and other governments to consider debt concessions in return for greater engagement with NbS.

Furthermore, following the development of the Loss and Damage Fund at COP27, the potential for climate reparations to assist the government of Pakistan's financing of NbS projects should not be understated. It is crucial that the Loss & Damage fund contributes to strengthening of DRM via NbS to mitigate against the future impacts of severe flooding in Pakistan.

7. Proposed Recommendations



Photo: Khaula Jamil (2019)

7. Proposed Recommendations

To address the outlined challenges, the report presents four key recommendations to facilitate designing, implementing, and monitoring NbS (Table 5). These recommendations are of relevance to all key stakeholders who wish to successfully implement learnings, build resilience, and empower local actors within DRM practices.

Table 5. Proposed Recommendations.

Core Theme	Recommendations
Overarching	<ol style="list-style-type: none"> 1. Implement a knowledge sharing platform to facilitate connections between knowledge reservoirs and implementing partners for nature-based solutions.
Resilience-Building	<ol style="list-style-type: none"> 1. Introduce nature-based solutions in Phase 2 for a “build-back-better” approach. 2. Focus on the role of the community to integrate NbS for resilience building. 3. Expand the integration of livelihood approaches, focusing specifically on climate-smart agriculture. 4. Operationalise communication with implementing and academic institutions. 5. Promote accountability to ensure effective operationalisation of resilience-building projects.
Knowledge	<ol style="list-style-type: none"> 1. Create a decentralised knowledge transfer platform led by national organisations, separate from donor interests. 2. Standardise knowledge and information on NbS, incorporating expertise and local knowledge. 3. Pair scientific expertise with local knowledge and experience to design, implement and maintain NbS. 4. Employ a triple loop learning model to ensure learnings from flood events are implemented successfully.
Institutions and Funding	<ol style="list-style-type: none"> 1. Strengthen localisation and collaborative decision making. 2. Use advocacy capacities to mainstream NbS in public and government narratives. 3. Facilitate conversations between the GoP and other governments to consider debt concessions for greater engagement with NbS.

8. Conclusion



Photo: Concern 2023

8. Conclusion

Pakistan is bearing the weight of the climate crisis, and the 2022 floods have presented pressing need to strengthen communities' adaptive capacities. Increasing flood risk, coupled with Pakistan's large agricultural sector, exemplify the need for an environmentally sensitive system that attends to both people and nature during crises (Oliver et al, 2013). NbS present Pakistan with a unique opportunity to strengthen DRM practices against Pakistan's multi-hazard profile, whilst protecting livelihoods and increasing community resilience. As such, this report has explored the role of NbS in Pakistan in response to the 2010 and 2022 floods, and the opportunities for their future incorporation by DEC member charities.

The research has highlighted three central themes to the implementation of NbS in Pakistan. Firstly, NbS should be enacted within resilience-building approaches which engage with communities and livelihoods to benefit both people and environment. In DEC appeals, these are best implemented in Phase 2 as "build-back-better" approaches. Secondly, there is an evidenced disconnect between existing knowledge on NbS and their mobilisation among both DEC member and external agencies, despite established repertoires and partnerships. Thirdly, the institutional environment that NbS are operating within is limited by funding discrepancies, a lack of willingness and interest to implement these and insufficient collaboration among stakeholders. As a result, continued monitoring of climate negotiations will be crucial to understand the role that the Loss and Damage fund will play in the investment of NbS for adaptation and mitigation practices. Addressing these challenges is essential to realise the potential for resilience-building that NbS can provide, particularly as a mitigation strategy.

To address the outlined challenges, the report presents four key recommendations to facilitate designing, implementing, and monitoring of NbS (Section 7). These

recommendations are of relevance to all key stakeholders who wish to successfully; implement learnings, build resilience, and empower local actors within DRM practices.

This report opens many avenues for future engagement. These include engaging with community perceptions on NbS programmes to better understand their connection to livelihoods. Additionally, carrying out research at a later stage in the response would provide better insight into NbS, considering the strong linkage between rehabilitation and NbS practices for resilience-building. Finally, it recognises the need to assess the relations between NbS, social power, and the creation of vulnerability, focusing specifically on gender and livelihoods in Pakistan.

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10. Appendices

Appendix 1: Repertoires of Knowledge on Nature-based Solutions

Location	Resource
Pakistani Resources	<p>Research and Development Foundation (RDF). The RDF are a registered and certified NGO in Sindh who focus on building community resilience in climate sensitive provinces. The RDF release annual reports, quarterly newsletters and have multimedia resources on their on-going and completed projects.</p> <p>Link: https://rdfoundation.org.pk/</p>
	<p>Rural Development Foundation. A non-political, not for profit, NGO focused on stimulating rural development through programs at the local level focused on livelihoods and sustainable agriculture.</p> <p>Link: https://rdf.org.pk/</p>
	<p>Sindh Agricultural University. University research institute providing expertise knowledge on agricultural practices, particularly with regards to climate smart agriculture and water scarcity and management practices.</p> <p>Link: https://sau.edu.pk/</p>
	<p>International Islamic University, Islamabad. University research institute centred on developing higher Islamic education in Pakistan. The university has previously partnered with Concern Pakistan on a climate-smart agriculture programme.</p> <p>Link: https://www.iiu.edu.pk/</p>
	<p>Community World Service Asia (CWSA). Humanitarian and development organisation registered in Pakistan. CWSA's website contains Pakistan specific alerts, situation updates, online videos, publications, and policy guidelines.</p> <p>Link: https://communityworldservice.asia/</p>
	<p>Government of Pakistan; Ministry of Climate Change; National Disaster Management Authority (2012) - National Disaster Management Plan. A comprehensive report that aims to enhance adaptive capacities to prepare and respond to Pakistan's multi-hazard profile. The report details Pakistan specific DRM strategies.</p> <p>Link: https://cms.ndma.gov.pk/storage/app/public/plans/October2020/eUvDKZR0Qa0f2eA966um.pdf</p>

	<p><i>World Wildlife Fund (2019) - Recharge Pakistan: Building Pakistan's Resilience to Climate Change through ecosystem-based adaptation for Integrated Flood Risk Management.</i></p> <p>With a specific focus on building resiliency to climate change, this Concept Note provides an outline for the need to utilise ecosystem-based adaptation (EBA) measures (including NbS) for a more integrated approach to flood risk management. The project advocates for Pakistan to implement a paradigm shift towards mainstreaming EBA measures in flood risk and water management.</p> <p>Link: https://www.greenclimate.fund/document/recharge-pakistan-building-pakistan-s-resilience-climate-change-through-ecosystem-based</p>
<p>International Resources</p>	<p><i>UNFCC (2021) - Updated Nationally Determined Contributions.</i></p> <p>Detailed report showcasing the Government of Pakistan's progress on climate action, discussing the role of Nature-based Solutions within its plan.</p> <p>Link: https://unfccc.int/sites/default/files/NDC/2022-06/Pakistan%20Updated%20NDC%202021.pdf</p>
	<p><i>Re-Alliance (UK).</i></p> <p>Re- Alliance a coalition of expertise and experience, focusing on how regenerative development in response to disasters and displacement.</p> <p>Link: https://www.re-alliance.org/about-us</p>
	<p><i>International Union for Conservation of Nature (IUCN).</i></p> <p>A membership union comprised of both government and civil society organisations. An online database providing topic specific information on Nature-based Solutions. Topics include: agriculture and soil biodiversity, disaster risk reduction, ecosystem restoration, nature-based solutions for climate, nature-based solutions for cities.</p> <p>Link: https://www.iucn.org/our-work/nature-based-solutions</p>
	<p><i>European Natural Water Retention Measures Platform (EU).</i></p> <p>A detailed webpage on EU natural water retention measures (NWRM) supporting the implementation of green infrastructure programs. The webpage has a detailed catalogue of case studies and decisions for supporting the implementation of NWRM.</p> <p>Link: http://nwrn.eu/</p>
	<p><i>UKAid, World Bank, CGIAR, Climate Change Agriculture and Food Security, CIAT5 (2019) - Climate-Smart Agriculture in Pakistan.</i></p> <p>A country profile overview on the role of climate-smart agriculture (CSA) in response to climate and Pakistan's development goals more broadly. It aims to provide key expertise on the entry points for investing within CSA.</p> <p>Link: https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA-in-Pakistan.pdf</p>

Appendix 2: DEC Member Agency Implementation Methods

Name of Organisation	Delivery Approach
International Rescue Committee (IRC)	Direct
Islamic Relief Pakistan (IRP)	Direct
Concern	Local NGO Partner(s)
Tearfund	National and Local NGO Partner(s)
Action Against Hunger	National NGO Partner(s)
Age International	International and Local NGO Partner(s)
Oxfam	National and Local NGO Partner(s)
Care	National and Local NGO Partner(s)
British Red Cross	National Affiliate
Save the Children UK	Local NGO partner(s)
CAFOD	National NGO partner(s)
<i>Data: DEC Phase 1 Reports (2023).</i>	

Appendix 3: Researcher Profiles

Olivia Claxton is an MSc student in International Development and Humanitarian Emergences at LSE. She received her undergraduate degree with honours in Geography from Queen Mary University of London, with an exchange year at the University of Auckland. Olivia's professional experience to date is within community engagement and project management within Local Government in Auckland. Her academic research interests are related to global environmental governance and disaster risk reduction, with a specific focus on exploring positional vulnerability and expanding resilience within disaster settings globally.

Iona Bell is currently pursuing an MSc in International Development and Humanitarian Emergencies. She holds an MA in Geography and Sustainable Development from the University of St Andrews, where she worked as Researcher on the AHRC funded project "El Niño: Phenomenon of Opportunities", studying the impact of floods on rural livelihoods and working on climate change education in Peru and the UK. She also acted as International Development Consultant within this project, collaborating with educational authorities in Peru. Prior to this, she has worked on migration in conflict settings in Nicaragua and has extensive volunteering and advocacy experience. Her academic and professional interests focus predominantly on the overlap between humanitarianism and development, including topics of disaster risk reduction, gender equality, and conflict resolution.

Zain Aslam is an MSc student in International Development and Humanitarian Emergencies. He received his undergraduate degree with honours in Philosophy, Politics and Economics (PPE) from the University of Warwick. Between 2016 and 2019, Zain helped 'Action Against Hunger' raise money for humanitarian emergencies. The fundraising events raised £66,000 for food packages in Syria, £76,000 for clean water pumps in Yemen and £113,000 for food and medical supplies for Rohingya communities in Cox's Bazaar, Bangladesh. Zain has previously volunteered in Pakistan, drafting Progress Reports and teaching English at the SOS Children's Villages in Lahore. Zain's professional experience also lies in International Development. He worked as an intern for PWC's International Development Department on the 'Leave No Girl Behind' programme within the 'Girls Education Challenge' to promote educational development and beneficial social norms for girls in Afghanistan.