



SYNTHESIS OF **WATER WINDOW CHALLENGE RESULTS**

Global Resilience Partnership
September 2019

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**GLOBAL
RESILIENCE
PARTNERSHIP**

**WATER
WINDOW**

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Images

Front cover: BRAC; back cover: DRC/Clare Stott

Contents

Executive Summary	1
1. Context.....	6
1.1 The Global Resilience Partnership.....	6
1.2 Focus of this document.....	6
1.3 The Water Window Challenge grantees.....	7
1.4 Shocks and stresses.....	8
1.5 Impact Pathways	12
2. Methodology.....	14
2.1 Final narrative report synthesis.....	14
2.2 Outcome analysis	16
2.3 Cost–benefit analysis.....	16
2.4 Limitations	16
3. What have GRP Water Window Challenges achieved?.....	18
3.1 GRP Indicator 1: People Supported.....	18
3.2 GRP Indicator 2: Net dollar benefit	20
SUMMARY.....	21
4. Exploring outcomes: scaling grantees	25
4.1 DRC: transforming flood risk into livelihood opportunities	25
4.2 LWR: access to information, training and community organization.....	27
4.3 Mercy Corps: partnerships – advocacy – influence.....	29
4.4 Practical Action: resilience through layered intervention.....	30
4.5 Seacology: strong partnerships, increasing knowledge through training.....	32
4.6 Summary of outcomes and approaches	33
5. Progress along Impact Pathways	36
5.1 Impact Pathway 1: Policy Influencing	36
5.2 Impact Pathway 2: Finance and Investment	39
5.3 Impact Pathway 3: Innovation and Scaling	41
5.4 Impact Pathway 4: Knowledge and Partnership	46
5.5 Impact Pathway 4: Knowledge and Partnership	49
6. Conclusions.....	51
Annex 1: Full project descriptions.....	54
Annex 2: CBA case studies.....	65

List of figures and tables

Figure 1:	Map of countries targeted by Water Window Challenge.....	9
Figure 2:	Methodology outline.....	14
Figure 3:	Step-by-step approach to data synthesis	15
Figure 4:	Total number of people supported by WW grantees	18
Figure 5:	Policies engaged with and policies proposed/adopted	36
Figure 6:	Investments mobilized by GRP grantees (USD).....	40
Figure 7:	Users of EWS or climate information	42
Figure 8:	Number of people trained	45
Figure 9:	Knowledge products generated and people accessing knowledge products	46
Figure 10:	Partnerships formed.....	47
Table 1:	WW grantees and their projects.....	7
Table 2:	Visualization of shocks and stresses as they affected GRP projects.....	10
Table 3:	Relevant reporting sections of FNR template.....	15
Table 4:	CBA findings.....	22
Table 5:	Grantees mapped against outcomes areas.....	34
Table 6:	Summary of enablers by Impact Pathway	51

Acronyms and abbreviations

CBA	Cost–Benefit Analysis
CBO	Community-Based Organization
CDMC	Community Disaster Management Committee
COFREP	Community Flood Resilience Project
DHM	Department of Hydrology and Meteorology
DMC	Disaster Management Center
DRC	Danish Refugee Council
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EbA	Ecosystems-based Approach
ESII	Ecosystems Services Identification and Inventory
EWS	Early Warning System
FNR	Final Narrative Report
GEF	Global Environment Facility
GRP	Global Resilience Partnership
IP	Impact Pathway
ISSET	Institute for Social and Environmental Transition International
LOKADO	Lotus Kenya Action for Development Organization
LWR	Lutheran World Relief
MEL	Monitoring, Evaluation, and Learning
MoU	Memorandum of Understanding
NGO	Non-Governmental Organization
NPV	Net Present Value
NRC	Norwegian Refugee Council
R1	Round 1
SMS	Short Message Service
SVR	Site Visit Report
TBR	Transboundary Resilience
UNDP	United Nations Development Programme
WW	Water Window

Foreword

Floods pose a significant threat to lives and livelihoods across the globe. In fact, material losses alone from flood-related disasters account for almost half of all losses from natural hazards. This challenge affects almost every country and raises significant questions of how communities can cope, especially as climate-related flood disasters are increasing in both frequency and severity.

Our research shows that building pre-event resilience is more cost-effective than investing in post-event response and recovery, which is why in 2013, Zurich Insurance and the Z Zurich Foundation launched our flood resilience program.

We chose to work with the Global Resilience Partnership in 2015, investing in 12 projects through the Water Window Challenge – the learning from which this report brings together. In particular, we were looking to accelerate the impact that we were able to have. As you will read in this report, more than 500,000 people have been supported through these projects to strengthen their resilience to floods. This is a very positive result!

More important, though, was the opportunity to seek out interesting and innovative approaches to developing pre-event resilience to floods.

A couple of examples stand out for me. First the floating houses project in Bangladesh, led by BRAC University/University of Dundee. This project developed a sustainable flood-resilient living solution in one of the most flood-prone regions of the world. Not only did houses float as flood waters rose, but they also incorporated methods to provide potable water, food, cooking gas from waste recycling and potentially a continuation of livelihoods. This multi-dimensional approach looked at the house as a system, recognizing that resilience to flooding is more than simply staying dry. The design underwent 18 different revisions as it evolved and there are still more lessons to learn. Winning the RISK Award at this year's Global Platform for Disaster Risk Reduction (DRR) event has netted them a further €100,000 to scale it out.

The second to stand out for me was the work of Seacology in Sri Lanka. A mangrove management project does not speak of too much innovation, but the way in which they engaged communities and developed mangrove-centered livelihood approaches, particularly aimed at women, is proving to be a model that is influencing national policy in this area. They are also award winners, picking up the UNFCCC¹ Momentum of Change Award and a nomination for the Sasakawa Award at the Global Platform event. As this report shows, though, these are not the only examples of success from the projects. I could cite many others.

A pre-requisite for any endeavor that wishes to innovate is the creation of space to enable calculated risk-taking. Building resilience is not an exact science – experts do not even agree on a common definition for it – so, finding innovation is largely about experimentation. Through the Water Window we have invested in seven pilot projects (small-scale tests of ideas such as the floating houses in Bangladesh) as well as experimenting whether pilots could be scaled in five other projects (such as that run by Seacology).

A vital component to the success we have achieved has been to have a learning mindset. Using trial and error approaches, which may fail, provided there is a process to learn and



David Nash,
Senior Flood Resilience
Alliance Manager,
Z Zurich Foundation

¹ United Nations Framework Convention on Climate Change

adapt, leads to really successful outcomes. Thomas Edison wrote on the invention of the lightbulb “I have not failed. I just found 10,000 ways that won’t work.” It is this determination to learn from experience that has led to the results we have achieved.

The final section of the report draws out some key lessons that we have learnt from the overall experience that could have a significant impact on the way we approach future resilience building. In particular – and a direct challenge to all stakeholders – it raises the question of how to build effective partnerships that are capable of taking an adaptable approach. The idea of partnership is not new, but truly sharing responsibility for delivering a common objective takes a huge leap of faith for funders and implementers alike. Similarly, the thought of entering a relationship where you do not know precisely how you will reach the outcome, is uncomfortable.

Building trust; sharing responsibility and resources collaboratively; being prepared to fail and adapt – are all essential elements in driving innovative change.

I hope you enjoy reading this report on how we have achieved success through adaptable management and partnership.

David Nash – Senior Flood Resilience Alliance Manager
Z Zurich Foundation

Executive summary

Introduction

The **Global Resilience Partnership (GRP)** aims to create a nurturing environment that enables great innovations to thrive, be tested, and scaled when ready. It provides grants to consortia of organizations working to strengthen resilience to the world's most vulnerable people.

GRP has commissioned two challenge rounds: a general resilience round, also called Round 1 (R1), and a Water Window (WW) round, with a particular focus on resilience to flood-related issues. Through these rounds, GRP works with 22 projects and 21 grantee consortia in 16 countries across sub-Saharan Africa and South and Southeast Asia.

The WW Challenge comprises 11 grantees that implemented 12 projects: six in Southeast Asia, five in South Asia, and one¹ in sub-Saharan Africa. Water Window grantees were funded by the Z Zurich Foundation.

This synthesis summarizes progress the grantees have made,² and how they have done it. It is structured according to four Impact Pathways, which are core to GRP's strategy to achieving impact and reflected in the design of all R1 and Water Window Challenge projects.

These Impact Pathways are:

1. Policy influencing
2. Finance and investment
3. Innovation and scaling
4. Knowledge and partnership

The synthesis explores results from ten grantees, guided by these pathways in combination with the data that the grantees reported on relevant GRP indicators. In addition, the synthesis explores the outcomes of the five "scaling" grantees (funded to scale rather than pilot an idea) in more detail, pulling together key themes from their narrative statements.

Activities and reach

The 10 GRP WW Challenges for which we have validated data, supported over 500,000 people across eight countries, the vast majority of whom are in Asia. Around 51% of those reached are women. They have carried out a combination of interventions that strengthen livelihoods with capacity building around resilience planning, information systems, and infrastructure to increase resilience. The grantees have created at least 22 new partnerships, have enabled at least 189,362³ people to use early warning systems (EWS) or climate information, and trained at least 16,920 people in the use of more resilient agricultural techniques, alternative livelihoods, and disaster risk reduction (DRR).

² Excluding University of Waterloo whose final reports were not submitted in time for inclusion

³ This figure is based on the five grantees reporting against the indicator "Number of users of early warning system or climate information"

Progress against Impact Pathways

Evidence of progress against Impact Pathways is taken from the narrative reports, with some evidence against indicators chosen by the grantees

Impact Pathway 1: Policy influencing

Engaging with and influencing local or national policy played an important role in the projects. All grantees engaged with policy and policy-makers, even where it was not a main focus of the project. The mechanisms through which they did this highlight the need to step beyond superficial engagement (e.g. simply having a meeting with someone) to finding ways of engagement that are of interest to key stakeholders and produce positive outcomes for all parties (e.g. meeting with local government to support the development of their own EWS).

Impact Pathway 2: Finance and investment

Six of the grantees have mobilized new funds. There is a relatively large difference in activity in this area between grantees, with some having mobilized large new grants, while others continue to look for new investment opportunities. Demonstration, sharing of learning, and partnership all enable the mobilization of new funds.

Impact Pathway 3: Innovation and scaling

Innovations are happening in relation to technology, infrastructure, organizational systems, agricultural techniques, and stakeholder-led approaches in particular. Grantees report a wide range of opportunities to ensure sustainability as well as steps being taken to scale up. Common to many of these is the need for strong partnership working, community trust, and uptake of ideas, using learning to build on and ensure sustainability.

Impact Pathway 4: Knowledge and partnerships

These are key contributors to project delivery with knowledge sharing and project learning contributing to the development and sustaining of partnerships. Grantees use project knowledge and learning to advocate and influence as well as to support partners. Partnerships are central to the delivery of successful outcomes for all grantees. Partnerships have been built with a range of stakeholders and on different levels but they are all of strategic value. Grantees emphasize the importance of placing resource into the development and maintenance of these partnerships.

There were clear themes among elements described as enabling progress along the Impact Pathways, with effective partnerships and collaboration, participatory working, and use of evidence and learning being identified as important ways to achieve outcomes. The challenges faced by grantees were largely administrative, but social factors were also seen as challenges – with grantees using these to refer to the difficulties in establishing partnerships and keeping collaboration active. The key lesson learnt is the need to give time to the stakeholder engagement part of the approach and allow for flexibility and adaptation within project plans.

Scaling grantee outcomes

We also focused on the outcomes of the scaling grantees – those who were funded up to \$1 million to scale up an existing model or approach. The five scaling grantees are diverse in their approaches to enhancing flood resilience, with a range of different interventions being carried out and layered to enhance resilience. In all cases, these scaling grantees initiated and worked through community organizations, with a focus on inclusivity of women and vulnerable groups.

Outcomes indicate positive change, with the most notable outcomes including:

- **Mercy Corps** – 265,000 flood-prone individuals supported through reduced run-off, strengthened transboundary coordination at the Transboundary forum and community networks.
- **Danish Refugee Council** – harnessing 24 million liters of water for water harvesting, allowing for additional harvest and micro-irrigation, and improving provision of clean drinking water.
- **Seacology** – 347 community-based organizations (CBOs) established, 1,822 mangrove conservation awareness sessions carried out and significant influence made on national policy to conserve mangroves.
- **Lutheran World Relief (LWR)** – more than 3,000 households adopted and used flood resilience tools and practice, and more than 84,000 households have access to EWS information.
- **Practical Action** – increase in agricultural productivity despite adverse weather conditions, through use of flood resilience agricultural techniques, resulting in increased household food security.

Mercy Corps

Key progress and learning: Mercy Corps has successfully implemented 16 pilot interventions enhancing flood resilience in both up and downstream communities as well as implementing three large-scale interventions for flood mitigation and storm water management.

The project has been carried out in a participatory way, with a focus on women's involvement. Through legalization of a Transboundary forum, additional decision-making and influencing power has been given to stakeholders. Strong stakeholder buy-in has also triggered investment in future projects from a range of sources and had positive influence on decision-making among local government and the private sector, with positive outcomes in terms of changing large-scale construction practices.

Danish Refugee Council (DRC)

Key progress and learning: DRC practiced a layered approach to its Community Flood Resilience Project, putting in place several interlinked interventions to strengthen livelihoods and build community resilience to floods.

The project resulted in multiple livelihood improvements, including improved provision of clean drinking water, increased agricultural productivity and increased household income through cash for work schemes. Alongside these was the construction of water control and harvesting infrastructures, which both fed into the improvement of livelihoods while also transforming flood risk into livelihood opportunities. The project worked in a

participatory manner with a focus on women, and practiced demonstration and encouraged peer learning to spread best practice, including influencing other organizations and local government.

Seacology

Key progress and learning: Through the work of Seacology's project in Sri Lanka, communities were supported to come together in community-led plans to conserve mangroves. They set up 347 women-led CBOs to deliver training in livelihoods, provide access to microloans to support those new livelihoods, and provide awareness-raising and strategies to conserve mangroves.

The project is resulting not only in more resilient livelihoods and the conservation of mangroves but also in community strengthening and the empowerment of women. As well, the project is having a very important policy influence, feeding into the Sri Lankan government's initiative to conserve all mangroves, and increasingly has a global presence.

Lutheran World Relief

Key progress and learning: This project combines community-level approaches increasing information and training to raise climate awareness and flood-resilient techniques with support to local governments on two sides of a border (India and Nepal).

The project states that more than 3,000 household have adopted and are using flood resilience tools and practices, more than 3,750 have purchased insurance policies, and more than 84,000 have access to information to cope with and prepare for flooding. The project includes a focus on women and youth to enhance training and preparation for disaster, and has had positive support from government stakeholders as well as other organizations seeking to replicate the approach.

Practical Action

Key progress and learning: Practical Action works through layering a series of interventions to increase resilience through the provision of training in more resilient agricultural practice, access to market and climate information and alternative income generation options. It is working through 18 local women's associations, giving women better access to information from key institutions as well as training and support to create more sustainable livelihoods.

72% of beneficiaries are now receiving both disaster- and farming-related information services, with 95% applying that information. There is also positive evidence that farmers are sharing their knowledge with non-beneficiaries. Farmers are seeing the benefit of the new technologies, with increases in productivity despite flooding, and improved access to nutrition.

Overall lessons

The learning can be summarized in two points:

The importance of partnership and stakeholder engagement

Emerging from the synthesis is the **importance of partnership and stakeholder engagement** in particular, and the reports provide some evidence about how to ensure they work well. Ensuring the interventions are co-created, that they meet the needs and interest of stakeholders, and that lessons and evidence from the intervention are shared clearly are key to helping people engage. Finding ways of engaging that are reciprocal – so that the stakeholder is also being supported and helped to achieve what they want to achieve – is one particularly important way of incentivizing this.

Levels of information sharing, partnership building and stakeholder buy-in are critical to success

This level of **sharing of information, partnership building, and stakeholder buy-in** is also instrumental in ensuring that projects are scaled up or achieve sustainability. Grantees recognize the need to invest time in these activities, but also that in the rush to deliver projects within short time frames, and within a traditional project management structure, the time and flexibility that should be invested is often lacking. However, they have all recognized where and how these successful partnerships have been developed and will continue to build on them going forward.

Given the difficult climatic contexts within which these grantees are working, the **ability to be flexible and adaptive** in project planning is a key lesson relating to all of these challenges and something to be considered in relation to resilience projects in particular. This owes not only to the climatic conditions but also to the nature of successful resilience projects, which appear to layer different interventions and work closely with community interests, both of which bring added complexity and the need to be flexible. Time and flexibility are also required in relation to trying out new technology, with time needed to allow for adaptation and consideration of local perspectives and alternatives as well as to work successfully with local government stakeholders.

1. Context

1.1 The Global Resilience Partnership

One of the key objectives of the Global Resilience Partnership (GRP) is to create an environment that enables great ideas to thrive.

“There is a need for a safe space to test and scale disruptive, bold ideas for doing development differently. The [GRP] Challenges are a series of competitions hosted by GRP to tackle the world’s most intractable problems.”

The Global Resilience Partnership⁴

Through the GRP Challenges, GRP identifies innovative ideas with real-world impact and supports these initiatives to achieve their full potential, taking them to scale where possible. The outputs and outcomes from these challenges are then taken up through GRP’s communication work, its policy and influence agenda and the monitoring, evaluation, and learning (MEL) workstream. GRP has commissioned two challenge rounds: a general resilience round, also called Round 1 (R1), and a Water Window (WW) round, with a particular focus on resilience to flood-related issues. Through those rounds, GRP works with 22 projects and 21 grantee consortia in 16 countries across sub-Saharan Africa and South and Southeast Asia.

1.2 Focus of this document

This document presents the result of a synthesis conducted between January and March 2019 with the objective of identifying the outcomes, successes, and lessons learnt from projects designed and implemented by WW grantees.

While there were no specific evaluation questions to answer as such, the synthesis is anchored around a core two-part question:

1. To what extent and in what ways have GRP WW grantees made progress toward building resilience?
2. What have been the challenges and enablers to this progress?

In answering this question, the report synthesizes the available evidence to produce findings relevant to each of GRP’s four Impact Pathways as described in Section 1.5.

Section 1 outlines the background context of the WW Challenge grantees and the Impact Pathway (IP) used to design their approaches. **Section 2** sets out the methodology before **Sections 3.1 and 3.2** consider outcomes achieved against the two mandatory GRP indicators – GRP 1, number of people reached; and GRP 2, net dollar benefit per person. The narrative outcomes section (**Section 3.3**) then digs deeper into the outcomes of the five scaling grantees (Mercy Corps, Danish Refugee Council (DRC), Seacology, Lutheran World Relief (LWR), Practical Action). **Section 4** considers progress against each of the four IPs (see Section 1.5) and the final section (**Section 5**) considers enablers and challenges to the progress made.

⁴ GRP Challenge Update, March 2018

1.3 The Water Window Challenge grantees

The WW Challenge comprises 11 grantees that implemented 12 projects selected from 290 applications in a competitive process that was completed on 15 August 2016. Table 1 lists organizations that led the individual project consortia.

Table 1: Water Window grantees and their projects

Lead organization	Countries of focus	Project name	Scale or seed
DRC	Kenya	Community Flood Resilience Project	Scale
LWR	India, Nepal	Nepal–India Transboundary Resilience	Scale
Mercy Corps	Indonesia	Transboundary Flood Risk Mitigation through Governance and Innovative Information Technology	Scale
Practical Action	Bangladesh	Agriculture and water resilience in coastal areas in Bangladesh	Scale
Seacology	Sri Lanka	Building the Resilience of Vulnerable Coastal Communities against Floods in Sri Lanka	Scale
BRAC University	Bangladesh	Community-led Holistic Innovations for Flood Resilience in Bangladesh	Seed
ISSET	Vietnam	A River Basin Cross-border Flood Resilience Support Platform	Seed
MetaMeta	Bangladesh	Roads to the Rescue	Seed
One Architecture	The Philippines	One Resilient Team: Tacloban	Seed
University of Potsdam	Vietnam	Ecology and Gender Based Flood Resilience Building in Thua Thien Hue (ResilNam) – Urban Project	Seed
University of Potsdam	Vietnam	Ecology and Gender Based Flood Resilience Building in Thua Thien Hue (ResilNam) – Coastal Project	Seed
University of Waterloo	Vietnam	Development of Amphibious Homes for Marginalized and Vulnerable Populations in Vietnam	Seed

Full project descriptions are enclosed in Annex 1 together with further details on the consortium-leading organizations and their partners.

Backed by a US\$10 million commitment from the Z Zurich Foundation, the WW grantees received up to \$1 million in grants for innovative solutions to flood-related issues.⁵ The five

⁵ www.globalresiliencepartnership.org/challenge

scale projects each received \$1 million, with the seven seed projects receiving up to \$250,000 each.

All projects were given 18–24 months to implement their projects. Toward the end of the implementation timeframe, 11 projects, with the exception of that of the Institute for Social and Environmental Transition International (ISET), were granted additional time for completion.⁶ Of those 12 projects, this synthesis looks at 11 excluding the University of Waterloo, which did not submit its final narrative report (FNR) (the primary source of evidence for the synthesis) in time to be reviewed and analyzed.

1.4 Shocks and stresses

Of the 11 projects included in the synthesis, six were implemented in Southeast Asia (Vietnam, Indonesia, the Philippines), four in South Asia (Bangladesh, India, Nepal, Sri Lanka) and one in sub-Saharan Africa (Kenya). The projects were designed in the face of a new reality in those geographies: disasters and shocks are occurring more frequently and chronic stresses are lasting longer.⁷ All projects work with local people, including vulnerable groups, and organizations across the geographies to improve their resilience to flood-related issues, risks and disasters.

The Zurich Flood Resilience Alliance defines disaster resilience as “the ability of a system, community, or society to pursue its social, ecological, and economic development and growth objectives, while managing its disaster risk over time in a mutually reinforcing way.”⁸

The shocks and stresses experienced in the areas targeted by WW projects during the 18 to 24-month implementation period that spanned 2017 to 2018 included predominantly climate events, primarily storms, typhoons, heavy rainfall and frequent floods. Drought and sudden temperature rises were also reported, as well as stresses caused by conflict, pest infestation, and technical difficulties such as power cuts. Table 2 presents a summary of shocks and stresses experienced by respective grantees.

⁶ The University of Potsdam implemented two projects in coastal and urban areas of Thua Thien Hue in Central Vietnam. Applying a bottom-up ecosystem-based approach to adaptation, those two interventions resulted in relatively similar outcomes, success, and lessons learnt. We distinguish between the two interventions as required, but, when referring to more general findings applicable across both projects, we credit them to the University of Potsdam without further specification

⁷ Keating, A., Campbell, K., Mechler, R., Magnuszewski, P., Mochizuki, J., Liu, W., Szoenyi, M. and McQuistan, C. (2017). Disaster resilience: What it is and how it can engender a meaningful change in development policy. *Development Policy Review*, 35(1), 65–91.

⁸ <http://opim.wharton.upenn.edu/risk/library/ZAlliance-Operationalizing-Resilience.pdf>, p. 8

Figure 1: Map of countries targeted by Water Window Challenge

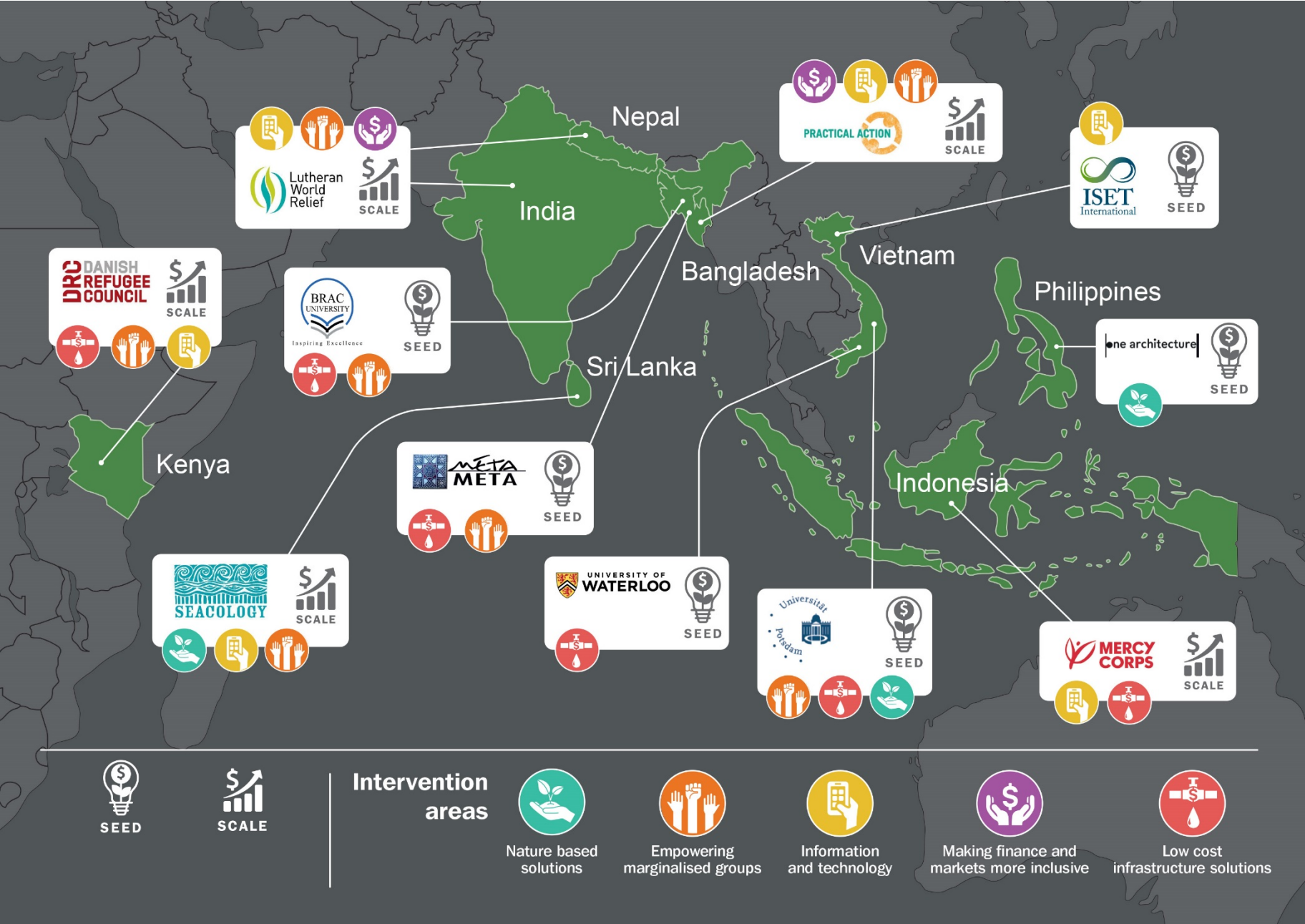







Table 2: Visualization of shocks and stresses as they affected GRP projects

Types of shock					
Project	Rainfall variability	Severe weather events	Temperature increase and drought	Food insecurity	Socio-political
					
BRAC	Unpredictable rainfall and river bank erosion; flooding		High temperatures [but also cold wave]		Local conflict and theft; lack of government power supply
DRC	Heavy rainfall and flooding		Severe drought	Pest-induced crop destruction	
ISSET	Increased and changing flood patterns	Typhoon Damrey	-		-
LWR	Heavy rainfall and storms	-	Temperature rise and fires		-
Mercy Corps	Frequent flooding	-	-		-
MetaMeta Research*					
One Architecture	Heavy rainstorms and flooding	-	-		-
Practical Action	Severe, repeated flooding	-	-		-
Seacology		-	Extended drought-like conditions		-
University of Potsdam		Typhoon Damrey		-	-
University of Waterloo		Typhoon Damrey			

*No shocks or stresses reported during implementation period.

Climate shocks and stresses

Storms, typhoons, heavy rainfall and frequent floods

The most frequent forms of shocks and stresses reported by WW projects included storms, typhoons, and other forms of heavy rainfall, which in most instances (six in nine projects) resulted in flood-related issues. Storms, typhoons, and heavy rains alone were reported by BRAC and the University of Potsdam. In addition, six other grantees (Practical Action, DRC,

Mercy Corps, LWR, One Architecture and ISET) experienced those shocks and stresses in combination with flooding.

In Bangladesh, the **BRAC** project faced severe climate shocks such as storms, extremely high temperatures and unpredictable heavy rainfall, which caused river bank erosion. The project area was also hit by a wave of cold weather that affected local housing.⁹

Thua Thien Hue province, where the **University of Potsdam** implemented both of its projects, was severely affected by Typhoon Damrey in October 2017. The shocks delayed works on both project sites and required a shift in the projects' efforts toward emergency relief.¹⁰

Heavy rainfall and storms increased the scale and/or frequency of flood-related issues experienced by six projects.

Practical Action, for example, reported severe, unpredicted and repeated flooding. These affected local infrastructure, including dike and sack cropping, which were implemented by the project.¹¹

Working in India and Nepal in 2017, **LWR**'s project was hit by the worst rains experienced in both countries in 15 years. Related shocks, mostly irregular and heavy rains and floods, affected 52% of households targeted. The rains caused significant loss of life, livelihoods and infrastructure across 35 of Nepal's 77 districts and at least four Indian states, with 80% of LWR's project implemented in India waterlogged for two days. Most of the project in Nepal suffered crop loss and infrastructure damage.¹²

Frequent flood events were experienced by **Mercy Corps** in Indonesia.¹³

Vietnam also suffered an increased frequency of storms and flooding in 2017, including Typhoon Damrey, which affected the two provinces targeted by **ISET**'s project in central Vietnam, Da Nang and Quang Nam.¹⁴

Working to combat flood risks in the Philippines, **One Architecture** experienced heavy rainstorms, pests, disease and upland flooding, which destroyed mangrove seedlings in the New Kawayan and Nula-tula pilot sites. This called into question the project's focus on coastal protection, to the neglect of a holistic approach considering inland water management.¹⁵

Heavy rainfall and consequent flooding caused significant displacement within **DRC**'s project working with refugee communities in Kakuma, north-western Kenya.¹⁶

Drought and temperature rises

Severe drought requiring emergency response was reported by **DRC** in north-western Kenya¹⁷ and **Seacology** in Sri Lanka, where repeated extended periods of drought-like

⁹ BRAC FNR, pp. 32–33

¹⁰ University of Potsdam SVR, p. 15

¹¹ Practical Action FNR, p. 28

¹² LWR FNR, pp. 21–22

¹³ MCI FNR, p. 78

¹⁴ ISET FNR, p. 16

¹⁵ One Architecture FNR, pp. 16–17

¹⁶ DRC FNR, p. 28

¹⁷ Ibid.

conditions affected mangrove nurseries, home gardens and other livelihood interventions implemented by the project.¹⁸

LWR reported sudden temperature rises, which caused a fire in a project site village destroying five houses and causing loss of clothing, grains stocks and household utensils.¹⁹

Other shocks and stresses

In addition to climate shocks and stresses, projects experienced other issues that affected their implementation efforts. These were conflict, technical difficulties, and pest infestation.

For example, lack of power supply to **BRAC**'s project sites in Bangladesh resulted in delays to project implementation. BRAC also faced community-level issues including sabotage, conflict and theft.²⁰ **DRC**'s project was faced by unexpected pest infestations, which damaged and destroyed crops, as meteorological forecasts were not communicated in time for communities to adequately prepare.²¹ Pest-related issues were also reported by **One Architecture**.²²

1.5 Impact Pathways

GRP worked closely with WW grantees to turn many of the above shocks and stresses into opportunities with the overarching objective of reaching millions of people, leveraging their initial investment and changing the resilience landscape. GRP's strategy is guided by four IPs, which are reflected in the design of each of the eight projects. These pathways were used to structure parts of the project reporting, which required grantees to answer the below questions.

1.		Policy Influencing	What are the policy changes needed for the project to succeed and to take its results to scale? What actions is the project undertaking or planning to influence and change policy?
2.		Finance and Investment	What are the potential investment opportunities for your project? Has the project mobilized any new sources of investment/funding? If yes, please outline the source, value and type of investment.
3.		Innovation and Scaling	What opportunities can your project explore to maximize impact? What steps have been taken to ensure project scale-up or exit (include scaling indicators)?
4.		Knowledge and Partnership	What knowledge events and partnership-building activities has the project engaged in? How has the project shared lessons and stories? What communications work is planned?

¹⁸ Seacology FNR, p. 9

¹⁹ LWR FNR, pp. 21–22

²⁰ BRAC FNR, p. 33

²¹ DRC FNR, pp. 11, 37

²² One Architecture FNR, p. 17

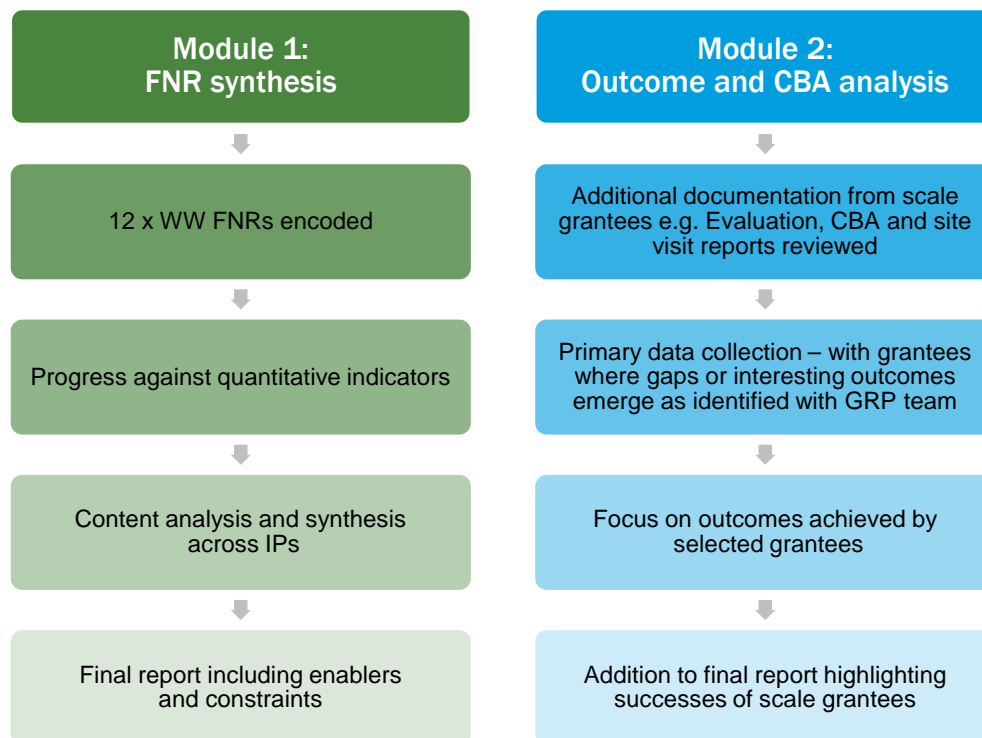
These IPs are used to structure this synthesis, with Section 3 exploring grantees' narrative answers to these questions and Sections 4 and 5 using them as guidance for the analysis of both the data around outcomes and the enablers and challenges.

In addition to answering questions against these IPs, all WW projects were required to report the number of beneficiaries of their project (GRP Indicator 1), which informed Section 3.1 of this synthesis. They were also required to report the net dollar benefit per person (GRP Indicator 2). Grantees also chose to report on a number of additional GRP indicators chosen according to the nature of the project.

2. Methodology

Given that the objective of the synthesis is to identify the outcomes, successes, and lessons learnt from projects designed and implemented by WW grantees, the methodology includes a synthesis of both qualitative and quantitative results around progress and outcomes as well as an analysis of how progress has been made. Two distinct but related modules were followed (Figure 2).

Figure 2: Methodology outline



2.1 Final narrative report synthesis

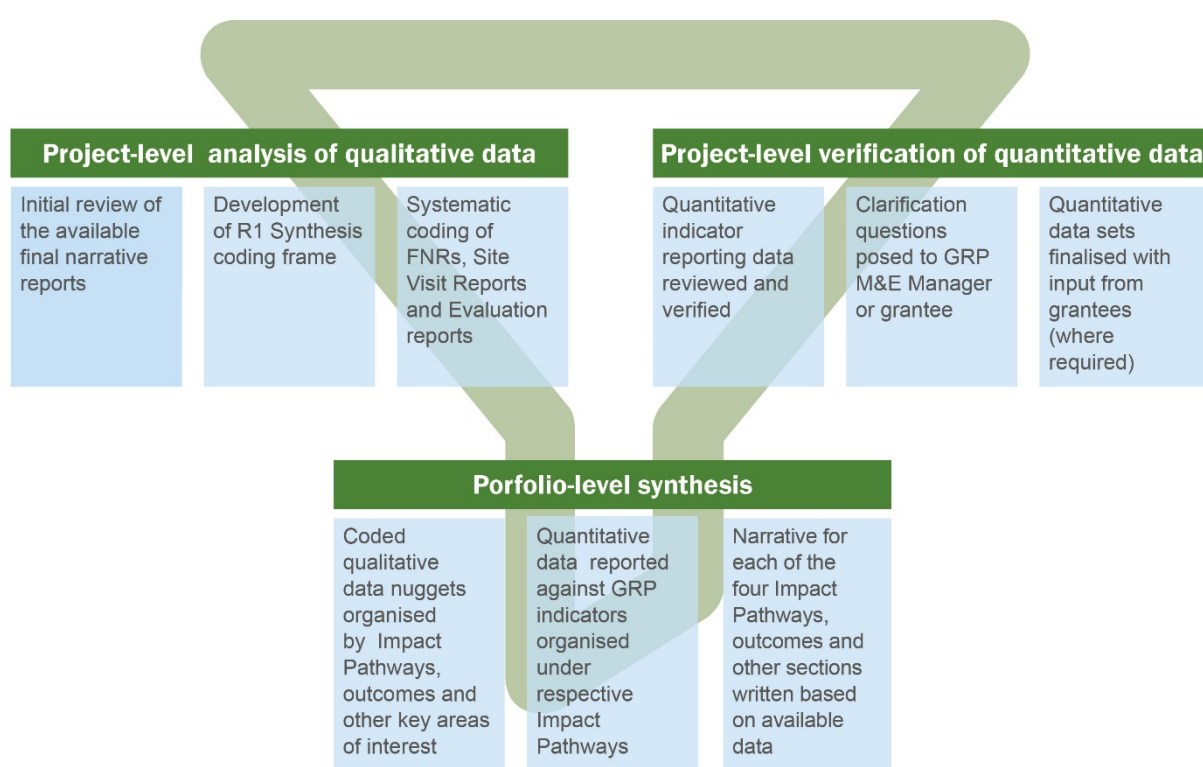
The synthesis draws on **qualitative and quantitative data** provided by grantees in their FNRs, which comprise three sections: activity reporting (Section A); results reporting (Section B); and reporting of lessons learnt (Section C) (see Table 3). The grantees included in the synthesis submitted their FNRs to GRP between September 2018 and March 2019.

Table 3: Relevant reporting sections of FNR template

Activity reporting	Results reporting	Learning
Section A detailed (i) progress against work plan activities. Grantees described the key activities accomplished. Grantees were also asked about (ii) opportunities and difficulties that they had experienced. They also elaborated on which activities had worked well and which ones had not.	In Section B, grantees outlined their (i) data collection strategy and methods, including how they (and their partners) generated evidence on (ii) progress against selected GRP and project-specific indicators. Grantees were asked to describe progress against selected indicators. Quantitative reporting was accompanied by a brief narrative on each indicator that grantees reported on outlining changes that had happened as a result of project activities and their project's contribution to such changes. Grantees were asked to provide (iii) IP narratives by answering the questions detailed in Section 1.2 of this report. Finally, grantees described (iv) shocks or stresses that had taken place during implementation of their project. Where relevant, they included evidence of how their project had built resilience and reduced the effect of shocks or stresses on the well-being of their beneficiaries.	In Section C, grantees reflected on (i) what had been learnt about their project during the implementation period and (ii) lessons learnt against the three Areas of Transformation by answering learning questions about inclusive decision-making, partnerships, and resilience thinking.

Figure 3 sets out the approach taken to data synthesis. The synthesis draws on qualitative data reported in all three sections (A, B and C) with a particular focus on grantees' progress and learning in relation to each of the four IPs. We also collated information reported on shocks and stresses experienced by the grantees during the project implementation period. Based on the available evidence, we created a coding frame, which we then used to code narratives in all reports.

Figure 3: Step-by-step approach to data synthesis



Synthesis of quantitative data comprised data verification and synthesis. We first reviewed all quantitative data submitted by grantees in Section B of their FNR and identified any figures that seemed unreasonable, inconsistent with the data reported in quarterly reports or not in accordance with GRP indicator reporting guidance. Inconsistencies were resolved and adjusted where necessary. The team then identified the indicators that were most relevant to the four IPs and included them as part of the evidence to be presented in each of the respective sections of the synthesis report.

When the qualitative data had been coded and the quantitative data verified, the datasets were organized under respective IPs and narratives were written based on the available evidence.

2.2 Outcome analysis

A separate piece of work was carried out to synthesize outcome evidence from selected grantees' final evaluation reports and site visit reports. The focus for this work was on scaling grantees: Mercy Corps, Danish Refugee Council, Seacology, Lutheran World Relief and Practical Action. Data on these grantees was collated and the most relevant information extracted, bringing together any primary data into grantee-level case studies and thematic analysis across the projects. This synthesis exercise followed a similar process to that for the rest of the data analysis, for consistency, for example detailed coding and the use of content analysis and quantitative analysis where possible. In synthesizing results, consideration was made of the frequency the same learning had been reported by multiple grantees and the different viewpoints on the same learning.

2.3 Cost–benefit analysis

We also conducted a **cost–benefit analysis (CBA)**, as GRP 2 was an indicator that WW grantees were asked to report on. The simplified process is presented here:

1. Review the documentation provided by grantees setting out their CBA approach and results (e.g. final reports, annexes, and MEL reports);
2. Summarize the approach taken, linkages to outcome evidence, the robustness of the approach, and what benefits and costs are covered;
3. Identify where there are likely to be relatively easy opportunities to strengthen CBA results;
4. Follow up with grantees to produce at least two case studies for the WW report.

2.4 Limitations

The main limitations to the synthesis relate to the quality of the FNRs that were the primary source of evidence, and the extent to which grantees evidenced their answers to questions posed under respective IPs (these questions are also set out in Section 1.5 of this report).

To mitigate this and ensure the reports were of the highest quality, the GRP monitoring and evaluation manager and Itad-led GRP MEL team provided written MEL guidance, one-on-one coaching during MEL clinics and ongoing support via a MEL helpdesk – an email address dedicated to grantees' MEL-related queries. Furthermore, guidance on indicators, learning, and scaling was provided in a series of MEL webinars. Beyond this, however, the team had limited control over the quality of FNRs, which the grantees were responsible for conducting using resources from their project budget.

Grantees reported quantitative data on a semi-annual basis with submissions continuously and grantees' final quantitative reporting was verified by the GRP MEL team. Grantees'

qualitative and quantitative reporting was further limited by the relatively short implementation time frame, resulting in reporting largely focused on activities delivered as well as outputs and short-term outcomes.

A final limitation relates to the time frame. The delayed submission of FNRs for some grantees made the timeframe within which to code and analyze the data extremely short. There were also limitations around the validation of the data, with some data still needing final validation owing to time constraints.

3. What have GRP Water Window Challenges achieved?

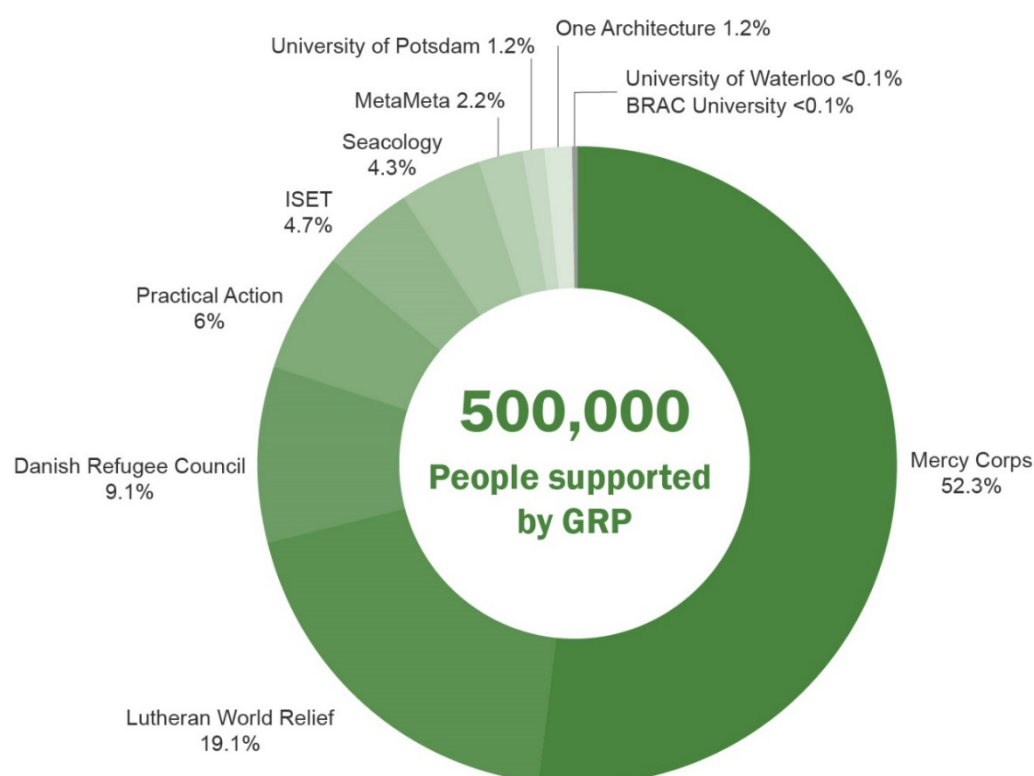
Evidence to support achievement of the WW Challenges covers key GRP indicators as well as narrative evidence on outcomes. GRP 1 and GRP 2 are the mandatory indicators. GRP 1 – number of people reached and GRP 2 – net dollar benefit per person. Alongside analysis of these quantitative measures, Section 3.3 examines the narrative around outcomes for the five scaling grantees.

3.1 GRP Indicator 1: People Supported

GRP's WW grantees were motivated by an ambition to improve people's resilience to floods and other shocks and stresses. Grantees measured the number of people supported by their projects across their implementation period. **Overall, the 11 grantees reported supporting over 500,000 people.**²³

There is variance across grantees in terms of the types of support they provide and progress toward their own targets. While some have fallen short, others have considerably exceeded their own expectations.²⁴

Figure 4: Total number of people supported by WW grantees



²³ According to GRP indicator reporting guidance, "support" is defined as assistance from the project or activity, with the intention of helping people become more resilient. There is a wide range of support types across the WW portfolio, but reporting was restricted to high- and medium-levels of support

²⁴ This number represents 68% of the portfolio-wide target for this indicator, which was 744,107. This shortfall owes partly to delayed guidance provided to grantees, resulting in over-targeting by those who included indirect, low-intensity beneficiaries which were not included in final progress reporting

Summary of project support to beneficiaries

BRAC University approached flood risk by developing innovations in flood-resilient housing. Their three floating homes and extensive training around them has directly supported 132 people in Bangladesh. The multi-functional homes have introduced technologies of rainwater harvesting, biodigester recycling, aqua- and hydroponics, and renewable (solar and wind) energy to a remote community in the Shariyatpur district.

DRC, the only grantee operating in Africa, delivered technical solutions to refugee and host communities in Kakuma, Kenya. Through training, EWS and installation of technologies such as road drifts, shade nets and trapezoidal bunds, DRC's Community Flood Resilience Programme (COFREP) supported 46,138 people.

In Vietnam, **ISSET** provided the necessary equipment to improve the local early flood warning systems. ISET provided two communes, Dai Hong and Hoa Khuong, with life vests, sirens, generators, flashlights, and megaphones, supporting the entire population of both – 23,628 people.

LWR aimed to strengthen early warning systems (EWS) and disaster risk reduction (DRR) strategies on the India–Nepal border. LWR has supported 96,790 people through the formation and strengthening of community disaster management committees (CDMCs) and cooperatives; provision of emergency flood equipment; flood drill exercises; introduction of an EWS; agricultural and business development support; and various other smaller-scale interventions.

As Figure 4 shows, **Mercy Corps** provided the largest contribution to the portfolio's progress by supporting over 260,000 people (43.4%). Its Transboundary Flood Risk Mitigation project in Indonesia aimed to build resilience through innovative and user-friendly information tools for vulnerable watershed populations. Support included pilot interventions (including tree planting, organic fertilizer production, and school activities); trainings (including social media training and training on the Ecosystems Services Identification and Inventory (ESII) tool); transboundary multi-stakeholder workshops; and community group activities.

MetaMeta's Roads to the Rescue project installed new culverts (structures that direct water under roads) to relieve drainage issues in Bangladesh. Insufficient water crossings in the polder causes frequent waterlogging and leads to crop failures, to which this intervention provides a solution. With six of the eight drainage bottlenecks addressed during project implementation, it is estimated that MetaMeta has supported 11,380 people (75%) of the polder population.

One Architecture's One Resilient Team, focused on restoring mangrove and beach forests in Tacloban, an area in the Philippines which was devastated by Typhoon Haiyan. An estimated 5,847 people were supported, comprising recipients of trainings and capacity-building workshops associated with the restoration pilot sites, as well as those living directly on the floodplains of pilot sites and benefiting from increased flood protection.

Practical Action tackled crop resilience in flood-prone Bangladesh, reaching 30,272 people by providing technical advisory services, trainings, and marketing support. Beneficiaries were equipped with the materials and knowledge to adopt innovative and climate-smart technologies such as vertical gardening, sack gardening, aquageoponics, and vermicomposting. A dedicated call center was also established to provide agricultural information to farmers.

Seacology supported 21,617 people in Sri Lanka with a focus on coastal mangrove protection through the formation of women-led CBOs. Members of these CBOs are supported with the set-up of mangrove nurseries, a mangrove conservation awareness program, access to microloans, and other skills development trainings.

University of Potsdam's ResilNam project aimed to support both urban and rural populations through two projects in Vietnam's Thua Thien Hue province. Combined, the projects supported

6,220 people. In both projects, training (on ecosystem-based adaptation, flood resilience, and DRR), advocacy, environmental improvement, and mangrove planting have helped demonstrate the value of ecosystem-based adaptation and strengthen the role of women in flood management.²⁵

The **University of Waterloo** completed four amphibious houses, benefiting 24 end-users and their neighbors who can retreat to the houses in case of severe flooding. In addition, 20 local workers and students benefited from training, bringing the total to 44 beneficiaries. Combining academic research and expertise with local knowledge, understanding of needs and context and local construction expertise were important drivers to the success of this project.

3.2 GRP Indicator 2: Net dollar benefit

Guidance on how to undertake CBA was provided to grantees and supported with a workshop session in Bangkok and two webinars. The aim was for them to draw on evidence of outcome changes to assess net benefits resulting from project interventions and to project these forward where appropriate. By calculating the stream of benefits and costs in today's money (using a suitable discount rate), it would be possible to estimate the net benefit per person (GRP Indicator 2). Comparing discounted benefits to discounted costs provides the benefit to cost ratio (B:C), one of the measures used in project appraisal.

If a project has a B:C ratio greater than one, the quantified financial or economic benefits exceed costs in today's money. The higher the B:C ratio, the higher are discounted project benefits relative to discounted costs. The B:C ratio is independent of scale²⁶ unlike GRP 2 and so, in principle, it is possible to compare across projects. However, the B:C ratio for any project is critically dependent on which benefits and costs are quantified and over what period – making it extremely difficult to compare across projects.

Eight of the eleven grantees provided CBA results (including six B:C ratios), shown in Table 4 below. Some grantees have linked their evaluation of outcomes directly attributable to the project to the B:C estimates – at least for some of the benefits. This has involved comparison of treatment and control groups (**LWR**) or quantification of benefits of new activities associated with the project (**Practical Action, University of Potsdam**). Others have estimated projected benefits based on expected results.

In practice, some grantees have chosen to estimate GRP 2 directly from estimated net benefits *within* the project lifetime. Most project costs fall within the project lifetime, but benefits may continue beyond this (from early warning of floods or new agricultural practices, for example). Consequently, this approach tends to understate net benefits (and the B:C ratio). Note that it is not possible to calculate the B:C ratio from a reported GRP 2 figure but if GRP 2 is greater than zero, logic dictates that the B:C ratio must be greater than 1, i.e. benefits exceed costs.

The majority of grantees have not included program costs (covering international staff, management and overheads) on the basis that project interventions are local and local stakeholders are interested only in financial returns. While it is certainly useful to illustrate local financial net returns, the lack of a broader economic perspective makes it difficult for funders to assess the returns on an investment. It is important to have estimates that include

²⁵ Strong roots, strong women

https://www.dkkv.org/fileadmin/user_upload/Veroeffentlichungen/Jahresberichte/DKKV_61_RESILNAM.pdf

²⁶ Consider project 1: discounted costs/person = 1000 and discounted benefits/person = 2000, B:C = 2, GRP 2 = 1000. Whereas project 2: discounted costs/person = 100, discounted benefits/person = 200, B:C = 2 but GRP 2 = 100

program costs, as these would be required when replicating scaling projects in new locations.²⁷

The choice of an appropriate discount rate can be a contentious issue for CBA as it determines how much less we value future benefits and costs than those occurring now. Climate sector analysis often involves very long-time horizons in which the choice of discount rate can make a significant difference. However, the WW projects typically focus on projected returns over 15 years or less and most do not discount at all – either because they consider only returns over the project life or because the calculation is simple and broadly indicative.

Table 4 below summarizes the CBA results the 11 WW grantees provided. None of these addresses all of the guidance as to how CBA should be carried out, but the **LWR** results are the most comprehensive (although overly conservative). The **LWR** estimates are very likely to understate the B:C ratio but nonetheless indicate that estimated benefits are more than double costs (see Annex 2 for more details). This is an example of a very significant return on program investment within the life of the project. To put this into context, very few financial investments more than double in value over 18 months.

The **University of Potsdam** results do a good job of illustrating the B:C for local stakeholders (see Annex 2) but do not incorporate program costs. This makes it impossible to say what the returns to the program were but, at a local level, economic benefits significantly exceed costs: looking over a 30-year period local benefits are more than double local costs under all reported scenarios. In the urban site, the project intervention was able to add huge value to a separately-funded large infrastructure investment to build a sluice – with local project benefits being more than 30 times local project costs.²⁸

The **Seacology** analysis is interesting as it is one of only two projects that compare changes for treatment with control groups. A GRP 2 estimate of US\$53 indicates that local project benefits exceeded costs within the project lifetime and hence the B:C ratio must exceed one for these costs and benefits. Given the careful use of outcome data, it would be good to see a B:C estimate based on this as the project team could do this with only a small amount of additional work. The other project results reported in Table 4 below are more speculative, for the reasons outlined above. Nonetheless, the evidence suggests that discounted benefits exceed discounted costs for local stakeholders. We do not have the evidence to claim this for the program as a whole.

SUMMARY

CBA evidence from across the WW grantee interventions suggest that benefits exceed costs when viewed from the perspective of local policy-makers (taking only local costs and benefits into account). This includes some cases where we have generated benefit to cost estimates from grantee data for GRP 2. However, the estimates have been limited by the exclusion of program costs and limited use of evidence on changes resulting from project interventions. Only one grantee (LWR) has done this, although it would be relatively straightforward for other grantees to present results from a program as well as local perspective.

²⁷ Unfortunately, we cannot simply use total grant costs for the whole project to do this, as the estimated financial benefits from project interventions typically relate to specific components of the project

²⁸ Ideally, the CBA for the much larger and separate sluice investment should add on the WW costs and benefits. The reported B:C ratio of 34 in Annex 2 assumes the sluice is built anyway and, by free-riding, overstates the return to the project intervention

Table 4: CBA findings

Lead implementer	CBA (B:C ratio – US\$)	GRP 2 (net dollar benefit per person)	Includes program costs?	Discount rate used	Use of outcome evidence & main sources of benefits
LWR	2.31	US\$581	Yes	None	Comprehensive. Uses a Method of Assessments for Projects and Programs to conduct workshops in communities involved in projects and a few communities without a similar intervention (the counterfactual). The only financial benefit estimated was increased agricultural income from use of hybrid, flood-resilient rice varieties during one planting season (affected by the 2017 flooding). Results are highly conservative and should also be estimated for projected flood risks over the next 10 years using a suitable social discount rate. The associated GRP2 estimate (US\$ 580.90) uses the CBA data and is equally conservative.
Seacology	None	US\$53	No	None	Comprehensive. Change in average household monthly income of control (no loan) and treated groups (receiving micro loans) compared pre- and post-project (with propensity score matching in one scenario). This provides a narrow GRP2 estimate of US\$53 within the project lifetime. It would be worthwhile estimating the broader project CBA by incorporating: number of beneficiaries to benefit from loans each year (depends on repayment rate and duration of loan); hectares of mangrove conserved (using economic value estimates per ha from published literature); full project costs; and expected costs of administering loans in future.
BRAC	1.61 1.04 2.81 ²⁹	US\$2,650 US\$262 US\$4,505	No Yes No	12% 12% 12%	None, as based on projected benefits from using a prototype house over 25 years for 18 people. Benefits include avoiding the cost of flood damage to the house and crops, but the largest benefits are from new agricultural activities (e.g. hydroponics and poultry). GRP 2 estimates use the same data and range from US\$262 to US\$4505.

²⁹ Based on the estimated cost of a modified rather than the prototype flood-resilient home actually built

Lead implementer	CBA (B:C ratio – US\$)	GRP 2 (net dollar benefit per person)	Includes program costs?	Discount rate used	Use of outcome evidence & main sources of benefits
DRC	247 ³⁰	US\$3,450	No	12%	Limited. A project participant survey on the perceived relevance of interventions found: EWS information (66%); DRR training (65%); and trapezoidal bunds for crop farming using flood water (55%). However, the CBA is based on assumed increases in net income for all households over 15 years for the above and in other areas (i.e. constructing a road drift). ³¹ Estimated benefit to cost ratios for project activities range from 1 to 9,760, and evidence is needed to validate these figures. The same applies to the GRP 2 figure of US\$3,450 estimated from the CBA data.
ISET	27.1 ³²	US\$25	No	None	None, as based on projected benefits of adopting an EWS, potential flood events in the next 10 years and an assumed 20% contribution to estimated benefits from the project. It provides an approximate indicative figure. Avoided losses include damage to household assets and crops but 77% of the estimated total derives from avoided livestock losses. The GRP 2 estimate of US\$25.18 is equally limited and can only be considered indicative.
Mercy Corps	1.24	US\$4	No	None	Limited. Flood risk projections used to 2031. Benefits limited to asset losses from storm water run-off (projected for Semarang city based on pilot area data) but impact on livelihoods is not captured. This will significantly understate benefits. As project costs are mainly incurred at the start of the project, the choice not to discount future benefits will overstate net benefits (but the lack of livelihood benefits will almost certainly dominate).
MetaMeta	NA		NA	NA	Work reported to be ongoing.

³⁰ A figure for GRP 2 was reported but a CBA was undertaken and the B:C ratio of 247 has been derived from the CBA spreadsheet provided

³¹ A drift is where a road crosses a stream or river bed with the water flowing over the road: <https://www.developmentbookshelf.com/doi/abs/10.3362/9781780442044.003>

³² Derived from benefit and cost figures presented in the ISET GRP Final MEL report

Lead implementer	CBA (B:C ratio – US\$)	GRP 2 (net dollar benefit per person)	Includes program costs?	Discount rate used	Use of outcome evidence & main sources of benefits
One Architecture	NA		NA	NA	No estimates presented in final reports.
Practical Action	NA	US\$71	No	None	Yes. Net benefits from new agricultural activities between baseline and endline estimated. As these were not undertaken previously, they can be attributed to the project. Based on the results of one or one and a half agricultural cycles, farmer net income (GRP 2) increased by US\$71 (with dike farming contributing 71%). Farmer costs but no project/program costs included. Would be worth estimating a project CBA by projecting future net farmer incomes, deducting program costs and discounting to current values.
University of Potsdam – Coastal – Urban	2.3 2.2 (no sluice) 34 (sluice benefits but not costs)	US\$12	No No	5% 5% 5%	Some. Urban recreation and aesthetic values of ponds estimated from choice experiment. Tourism survey estimated willingness to pay for half-day mangrove tour. By far the largest benefit (flood protection accounting for 46% of rural and 65% of urban benefits) relies on projections of risk reduction over 30 years. Estimated results are much bigger if a sluice is built (a large external infrastructure investment with costs not part of this analysis). Only local benefits and costs are reported (although global carbon benefits are calculated). It would be worth estimating global net benefits taking international and local program costs into account. The CBA data alongside estimates of people protected by the intervention is used to estimate GRP 2 (US\$12.39 is reported for the coastal site only).
University of Waterloo	NA		NA	NA	No estimates presented in final reports.

4. Exploring outcomes: scaling grantees

As part of a further exploration of the scaling grantee outcomes, we analyzed additional documentation, including independent and grantee-led evaluation reports, where available, and site visit reports. As with all grantees, the scaling grantees have selected indicators from the GRP indicator set to report against alongside the mandatory indicators – GRP 1 (number of beneficiaries – output) and GRP 2 (net dollar benefit per person) – and these quantitative results are illustrated against each grantee.

The results of GRP 1 and 2 have been outlined for all grantees in Sections 3.1 and 3.2; here we look at the additional outcomes emerging from the narrative results from each scaling grantee project. It is important to remember that grantees were not asked to measure changes in resilience, and therefore the narrative outcomes are important in trying to understand how those outcomes are impacting on resilience.

4.1 DRC: transforming flood risk into livelihood opportunities³³

The **DRC COFREP** project has used several interlinked, layering interventions to strengthen refugee and host community livelihoods, and build resilience to flood. These have included seed multiplication, EWS, water control and harvesting infrastructure, farmer training on dryland farming techniques, afforestation, and training on flood risk mitigation. Community participation has been central to the progress and sustainability of the project, which has also influenced other organizations and local government to consider a longer-term view of resilience planning.



73
hectares of area
under innovation



84%
of end users satisfied
with support



30,000
users of EWS or
climate information



Central to the development of more resilient livelihood strategies, is the work done to create infrastructure which harnesses floodwater and reduces flood damage. The infrastructure projects have resulted in 73 hectares (180 acres) of land being under various agricultural or water infrastructure innovations. Alongside the establishment of green belt areas with planting of indigenous tree seedlings to improve flood resilience, land use has included the following:

- 3 acres for the construction of the water earth pan and check dam
- 5 acres for both open air and shade, net farming in Wapet
- 7 acres for trapezoidal bunds
- 10 acres under tree nurseries
- 25 acres under greenbelt
- 100 acres under rain fed farming for sorghum and cow peas in Lotaka and Wapet villages, and
- 30 acres under pasture reseeding/production near in the green belts

³³ See full case study here: <http://www.globalresiliencepartnership.org/wp-content/uploads/2019/02/GRP-Water-Window-Case-Study-FINAL.pdf>

The construction of the drift on the road between Kakuma town and Latea improved access and resilience of local infrastructure to flood damage. The drift serves an estimated 13,214 individuals (8,021F, 4,193M) in 3,078 households, allowing them to access Kakuma Market and other social services such as hospitals and government offices. It has also improved trading between refugee and local communities. The same users are also benefiting from the earth pan for using the water for domestic use and watering their animals.³⁴

An earth dam and associated infrastructure improved water harvesting and management during flooding and during the rainy season, allowing for an additional sorghum harvest, and creating opportunities for micro-irrigation. Overall, over 24 million liters of water have been harnessed. Dam construction was adapted with the addition of in-built overflow mechanism to deal with the environmental problems caused by surface water run-off. After the amendments, affected farmers reported improved yields through increased water retention.

The livelihood strengthening activities resulted in:

- 165 household (population of 1,207) having improved provision of clean drinking water, which improved health outcomes and reduced the time burden associated with fetching water on women and children. “Time is saved from traveling too far to fetch water for drinking (for children). Health improved and they find time to assist in the homestead and focus on school studies.”³⁵
- 343 farmers received training in flood-resilient agricultural practices. The training was carried out in such a way as to cascade new knowledge to other farmers, and facilitate group learning.
- Crop diversification and increased agricultural productivity owing to shade nets and drought-adaptive farming training.
- Increased farmer understanding about how the use of natural products can improve crop yield and longevity to increase understanding of farming without pesticides and chemicals.
- Increased household income of targeted vulnerable households through participation of 98 people in cash for work scheme to construct trapezoidal bunds.
- Improved availability of food and diversified nutrition owing to increased acreage in agriculture and use of dryland techniques; 23% reporting food self-sufficiency in 2017 compared to 15% in 2016.
- Different thinking about agricultural practice. Farmer field schools and exchange visits were effective methods for cultivating farmers’ interest and imparting knowledge practically. “The farmers acquired analytical skills, would think critically and were able to make better decisions and execute them within the agricultural system.”³⁶

Another important area of intervention related to access to EWS and knowledge, with training provided to five CMDRRCs (Community-Managed Disaster Risk Reduction Committees) in community management of flood risks and better links created with national disaster preparedness committees. Flood awareness training sessions were also provided to 266 households, and the project has reached 4,527 households through community meetings or EWS with a population of 30,734.

“The second most significant change came from provision of early warning and weather forecast information. The community cited provision of weather information services as having increased their level of preparedness in anticipating rains and possible floods. The information

³⁴ DRC FNR p.22

³⁵ DRC FNR, p. 32

³⁶ DRC MEL report, p. 29

enabled them to create plans or strategies in case of anticipated floods or droughts. Further, the information enables the community to plan adequately on how to support the vulnerable groups. Weather information enables them to know which drought resistant crops varieties to grow and when to start planting.”³⁷

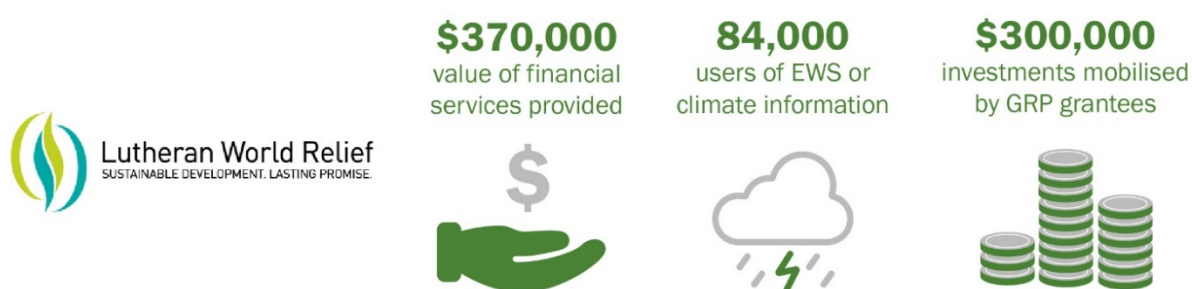
An independent evaluation confirmed that the coordinated implementation of complementary and interlinked interventions, including seed multiplication, EWS, the water control and harvesting infrastructures, farmers’ training on dryland farming techniques, afforestation and training on flood risk mitigation are all contributing to capacity of communities to be more resilient to water-related shocks and stresses.

The integrated approach was specifically tailored to the needs of women, the elderly, and other vulnerable groups. Activities focusing on women farmers strengthened their livelihoods, increased their productivity and reduced their dependence on other family members. Community-managed DRR action plans included specific provisions for elderly people, who, together with people with disabilities, also received agricultural inputs and training to make their practices more resilient.³⁸

Another key outcome was the influence on the approach by other organizations to consider a wider-framed view on community flood resilience. Whereas previously the focus might have been on physical infrastructure and response to flood, the new thinking is around the “human, social, built and economic environment within the area.”³⁹ The result of this is a 10-year vision for community resilience in Turkana West, which is accompanied by a strategy for community resilience on which future projects will be built.

4.2 LWR: access to information, training and community organization

The **LWR** outcomes include supporting flood-resilient transboundary communities that practice flood-resilient agricultural techniques, have increased awareness about flooding, put in place emergency fund mechanisms, and have access to early warning systems.



As a result of the project, LWR believes that “more than 3,000 households adopted and used flood resilience tools and practices, more than 3,759 households purchased crop and livestock insurance policies, and more than 84,000 households have access to real-time information to cope with and prepare for monsoonal activity.” Furthermore, “over 90% of

³⁷ DRC FND p.25

³⁸ DRC FND, p. 31

³⁹ DRC MEL report, p. iv

beneficiary households received early warning information in time from one or more sources and acted on that information.”⁴⁰

CDMCs were set up and are active and functional, meeting on a monthly basis. Reports from communities are that these groups are organized and active:

“... in Nepal, designated members of community disaster management committees (CDMCs) contacted the Department of Hydrology and Meteorology (DHM) for information and ensured communities received mass SMS notifications on the Nepal side of the Koshi River basin, and then passed messages to the trans-boundary communities in India. As a result, communities had adequate warning time to move to higher ground with their valuables.”⁴¹

Communities identified that women and children have a central role in ensuring that households are prepared for floods. As a result, the creation of standard operating procedures for transboundary EWS prioritized women, children and other vulnerable groups.

Communities more resilient to impacts of flooding during project

During the project timeframe, in August 2017, severe flooding occurred with the worst rains in 15 years causing significant damage to lives and livelihoods across project areas. As a result, there was damage of crops, homes, community building, loss of stored grains, communal wood and animal fodder, and damage to key infrastructure including roads and culvert. Communities report that the systems put in place by the LWR project considerably strengthened community preparedness, dissemination of key information, and protection of household assets. Both equipment and emergency response plans developed under the project were put into operation by CDMCs who had been prepared to respond to severe flood through project training. As a result, they disseminated vital information and disaster alerts to communities through a range of channels and provided access to loans, micro-credit or grain for affected households. Households also found that the livelihood components of the project to put flood-resilient agricultural inputs in place, coupled with improved economic resilience, minimized losses, and facilitated quicker recovery from flood damage.

LWR’s coordination efforts with relevant government departments allowed for adaptation of training, DRR and emergency response planning for the needs of people with disabilities, bearing in mind their heightened vulnerability in disaster situations.⁴²

Training on DRR and sanitation was carried out in ten schools reaching around 600 students; a total of 6,120 children were involved in various project activities. This focus on women and children was identified as a priority by communities, which recognized they were most likely to be affected by floods. The majority (81%) of beneficiary households are “satisfied” with project activities; 12.7% were “very satisfied.”

In terms of positive partnerships, the project reports the formation of 21 partnerships, with particularly beneficial outcomes coming through partnerships with government stakeholders. One of these partnerships with the DHM in Nepal, has resulted in support being given to their SMS flood alert system, strengthening the offer and widening its reach, resulting in 3,507,512 flood alert SMS being sent in Nepal. Indian and Nepalese governments have both officially recognized the improved efficiency of a community-based EWS and a memorandum of

⁴⁰ LWR FNR, pp. 21–22

⁴¹ Ibid., p. 23

⁴² Ibid., p. 86

understanding (MoU) has subsequently been signed between Nepal's DHM and LWR in order to further strengthen EWS in Nepal.

4.3 Mercy Corps: partnerships – advocacy – influence

Mercy Corps has used “win-win” pilot interventions in 16 communities to highlight the possibilities of enhancing flood resilience in both up- and downstream communities, alongside large-scale interventions and wide stakeholder engagement including development of a Transboundary forum, and the harnessing of technology for spreading the message about DRR, to increase resilience and influence stakeholders.



Mercy Corps have used the Z Zurich Flood Resilience Measurement Tool as part of their evaluation. The results from this indicate that 26,500 flood-prone individuals have improved their resilience mainly as a result of reduced run-off, strengthened transboundary coordination at the forum and through community networks. This is based on survey data, which compares baseline and endline scores against five capitals and four resilience characteristics. From this study, human and social capital are seen to have the greatest improvement, with human capital having improved on sources such as understanding future flood risk, flood exposure perception, and waste management awareness; and social capital having improved in relation to information sharing and community representation in decision-making structures.

Pilot projects have been implemented in 16 communities, enhancing flood resilience in both up and downstream communities, and three large-scale interventions and 15 smaller-scale community interventions for flood mitigation and stormwater management have been carried out. “1,616 people (821 male and 795 female) participated in small-scale pilot interventions for flood risk mitigation and water resources protection in villages upstream.”

The result of this has been not only improved resilience to flood for people living in the target watershed but also an important influence on decisions made by government and the private sector. An example of the latter comes from one major residential development company, which changed its site implementation plans to include flood resilience measures. The pilot projects also triggered co-investment from communities as well as investment in replications of the approach from local government and the private sector.

One of the key mechanisms in the project, the **Transboundary forum**, delivered strong outcomes once legislated, as this “enables members to advise the government on policy, influence relevant stakeholders and unlock potential access to funding for flood risk reduction.”⁴³ The forum involved 32 up- and downstream communities along with 22 other key organizations including local government, academic institutions, local non-governmental organizations (NGOs), community networks, and private sector. It helped actors to better understand the importance of transboundary linkages and created stronger community

⁴³ Mercy Corps FNR, p. 54

bonds across the boundary. Once legalized, the forum had the authority to run as a multi-stakeholder platform supporting ecosystem-sensitive decision-making and practices around the watershed.

“The project learned that transboundary coordination at the community level should be built on social cohesion. Through various cross-community and transboundary forum events, the communities gained trust and their social relationship improved. [As a result,] upstream and downstream communities are now better connected, have platforms to share their concerns and ideas for better watershed management in order to improve their quality of life.”⁴⁴

Mercy Corps

Significant outcomes have been achieved in relation to community flood management, with the project reporting that “26,500 individuals have improved flood resilience.” This number comes from 735 flood-prone households upstream of the Garang Watershed and 5,890 flood-prone households in downstream villages. The project states that resilience to flooding has been improved by reduction of run-off and improved transboundary coordination.

Another key area of outcomes has been in relation to early warning and disaster relief communications. The project has worked with a **popular communications app**, AtmaGo, to deliver DRR information; 8,000–9,000 people were using the app in the project area within a short time of the launch and 2,000 of those accessing disaster relief safety plans. At the time of reporting, 10,756 people had accessed community-based information including public safety reports through AtmaGo. This **new DRR function** of the app is something that will be expanded to further cities. The information generated is being used by 20 institutions.

Partnership and influence are both important mechanisms and outcomes of this project, with strong community and government partnerships set up, as outlined above, as well as collaborations with other international organizations. This collaboration has led to shared workshops on resilience and women’s empowerment, with a focus on promoting women’s role in flood risk reduction.

4.4 Practical Action: resilience through layered intervention

The success of **Practical Action’s** project hinged on the layering of a series of interventions that aim to increase resilience through providing new and more resilient agricultural practices, access to market and climate information and alternative income generation options. The project works through women’s associations, seeking to create more resilient livelihoods for women.



⁴⁴ Ibid.

The project has seven different components: agro-met information and advisory services, aquageoponics, crab nursery, dike farming, sack gardening, short-cycle shrimp farming and vermicomposting.

The project has developed and expanded the scope of 18 local women's associations, which produced positive benefits in terms of women's access to the key institutions, markets and information on pricing, and links to weather information, which was subsequently disseminated throughout the community.

An independent evaluation found that, compared with baseline and in comparison with a control group, female beneficiaries reported increased engagement in farming (62% reporting a great extent of involvement in farming in beneficiary household compared to 16% at baseline), increased involvement in household decisions around farming (98% reporting involvement compared to 68% at baseline) and also increased access to mobile phones and the weather information available through it (98% at endline up from 91% at baseline).

Communities are reporting improved access to relevant weather/climate information, which they are applying and also sharing. "Project beneficiaries have been receiving both disaster and farming-related information services in larger number (72%) compared to non-beneficiaries (48%). 95% of beneficiaries applied the information, and 65% shared it with others."⁴⁵ This peer learning has extended to learning about innovations, with 86% of beneficiaries reporting that they had disseminated the innovations to non-beneficiaries. Each beneficiary was aware that at least four non-beneficiaries to whom the innovation had been disseminated had adopted the innovation.

These new and more resilient agricultural techniques and alternative income generation options are being recognized as valuable by farmers, and a key outcome relating to sustainability relates to farmers who have decided to take the approaches on as independent enterprises.

"A large number of farmers are motivated to run it as an independent enterprise particularly in case of short-cycle shrimp farming, shrimp-dike cropping, cage aquageoponics farming, crab nursery, and sack gardening as a potential option for that area having competitive advantage from environment, gender and income perspective."⁴⁶

Increase in agricultural productivity is a key outcome, with evidence pointing toward new technologies such as sack gardening producing much higher yields despite difficult conditions. "These trained farmers practicing this technology (sack gardening) produced totally 18.4 metric tons of vegetables even in challenging water logging and adverse weather condition which they have never done before."⁴⁷ Additional work being done with the women's associations is creating new links between farmers and local dealers/traders and helping women get the best price for their produce and safeguard from shock such as cold, fog and attacks by insects.⁴⁸ As a result of improved agricultural productivity, beneficiaries report improved nutrition in their families:

⁴⁵ Practical Action FNR, p. 32

⁴⁶ Ibid., p. 39

⁴⁷ Ibid., p. 2

⁴⁸ Ibid., p. 40

“85% of respondents belonging to the treatment group mentioned that they had all three daily meals in the preceding week of the survey period (62% under control group).”⁴⁹

The independent evaluation carried out for Practical Action⁵⁰ included the use of the Flood Resilience Measurement Tool, and the results of this work indicates that project beneficiary households became more resilient in respect of improving livelihoods and developing livelihood skill in the event of flooding disaster. Examples of this include 66% of beneficiaries having access to food all year round, compared to 16% at baseline, and 55% of households having an income continuity strategy at endline compared to 33% at baseline.

4.5 Seacology: strong partnerships, increasing knowledge through training

Seacology’s focus has been on using community-based organization to support the building of alternative, resilient livelihoods (with a focus on women), the strengthening of community cohesion and community plans to conserve mangrove forests. Outcomes have been achieved in particular through strong local partnership, which is also creating opportunities for sustainability and scale-up.



\$52.97
net dollar benefit
per person



96.4%
of end users satisfied
with support



3,475
hectares of area
under innovation



In terms of clear activities leading to outcomes, the model of mobilizing communities through the development of CBOs, delivering training, awareness-raising, and access to mangrove nurseries has reached most of its targets, in some cases achieving more than expected. A total of 347 CBOs have been set up, made up of 3,470 women and youth, through which activities have been carried out to mobilize 5,543 people to protect 3,475 ha of mangrove (current figure). A total of 1,822 mangrove conservation awareness sessions have been carried out and 1,842 youth and women have been trained. Microloans have been delivered to 3,592 women and youth.

There is evidence that this community model of mangrove conservation is successful, with the CBOs focused on women and youth providing a conduit for the development of community-led approaches to conserving mangroves, resulting in community ownership of flood resilience through mangrove conservation. The community activities are also starting to build social bonds.

⁴⁹ Ibid., p. 23

⁵⁰ GRP AWRCAB report

“Community members are actively working together for the common good of preserving and restoring their mangrove forests. In addition, in the north, where the Sri Lankan civil war was particularly devastating, this has helped build greater ties between the Tamil and Sinhalese people.”⁵¹

Community strengthening is also happening through the empowerment of women, with the project focus on vulnerable women, particularly those in single-income households, giving them access to training and microloans, which is helping them create new, resilient livelihood options. Women are experiencing improved financial stability. Within the community, this is helping build their socio-economic status and the grantees believe this has the potential to shift gender roles within households and communities.

“These skills have led to these women-owned and operated businesses becoming more stable and profitable. In addition, women are being given a greater voice in their communities – they have greater confidence and knowledge and are being given a forum through the CBOs to take a larger role in public affairs.”⁵²

The focus on women has seen an increase in the monthly household profit of impoverished women in two of the areas by \$101.80 and \$75.19, respectively. Overall, the beneficiaries of the microloan project report a household monthly average profit increase by \$52.97 in northern and eastern provinces.

There is a very strong emphasis in the **Seacology** project on the importance of partnership with local government and NGOs and communities in creating successful outcomes. In particular, the project recognizes that one of the key outcomes is the successful, mutually beneficial partnership between **Seacology** and Sudeesa, which facilitated **Seacology**’s livelihoods work and built Sudeesa’s capacity to provide microfinance programs.

Seacology’s profile is rising, with the recent awarding of the UN Climate Action Award giving publicity to the different projects carried out, including the work in Sri Lanka. The project has played an influential role in the Sri Lankan government’s pledge to protect all mangroves.

4.6 Summary of outcomes and approaches

As stated in the introduction to this section, while Mercy Corps and Practical Action did study resilience with the use of the Zurich Flood Resilience Measurement Tool,⁵³ the grantees were not asked to measure changes in resilience. What they have provided evidence on is a range of outcomes that highlight the layered approaches projects adopted to build resilience. Despite the use of different approaches, the scaling grantees are demonstrating evidence of outcomes across common areas (Table 5).

⁵¹ Seacology FNR_v1, p. 10

⁵² Seacology FNR, p. 11

⁵³ <https://floodresilience.net/frmc>

Table 5: Grantees mapped against outcomes areas

Outcome evidence areas	Grantees
Early warning systems	Mercy Corps, DRC, LWR, Practical Action
Disaster preparedness plans and structures	Mercy Corps, DRC, LWR
Flood resilience infrastructure	DRC, Mercy Corps
Resilient farming methods	DRC, LWR, Seacology, Practical Action
Ecosystem education and management	Mercy Corps, DRC, Seacology,
Community strengthening	Mercy Corps, LWR, Seacology, Practical Action, DRC
Financial resilience	Seacology, LWR, DRC

These outcome areas demonstrate how the grantees are using more traditional development approaches (farmer training, community group building, credit programs) with approaches that deal directly with enabling people to face shocks and stresses (early warning systems, community disaster plans, flood-resilient infrastructure). It is also clear that there are common themes running through the outcomes.

Layering livelihood interventions

Strengthened livelihoods are key outcomes of the projects, which in turn may result in improved resilience. In particular, projects that layer interventions to strengthen livelihoods with interventions that relate to physical flood resilience create positive outcomes. Examples of this include **DRC**, which combines training in new agricultural technology with water control infrastructure; **Practical Action**, which uses agro-met advisory services alongside a range of agricultural interventions; and **Seacology**, which works through women and youth to increase resilience and protect mangroves.

The most common livelihoods outcome reported is in relation to increases in income, with projects reporting different ways in which this is achieved. These include the use of microloans to improve enterprises (**Seacology**), cash for work schemes (**DRC**), and increased agricultural and non-agricultural activity (**LWR**). Other common outcomes include improved agricultural productivity (**DRC, Practical Action**), food and nutrition (**Practical Action, DRC**), and training and education (**Seacology**).

Inclusiveness

Grantees report particular outcomes focused on **vulnerable groups**. For example, **Seacology** has focused on women, particularly those in single-income households, building their socio-economic status and improving income options and thereby financial resilience, but also providing the potential to alter gender roles through increased economic activity by women, which in turn increases resilience through involvement in decision-making. Some of these outcomes are an extension of the overall project outcomes, e.g. **DRC** reporting that children's health will have benefited from improved, diversified nutrition and access to safer drinking water. Others are outcomes of project activity targeted at vulnerable groups, for example, **LWR** targeted training on EWS with vulnerable groups and carried out training on DRR in local schools to ensure children had access to the same information as adults.

Practical Action increased women's access to flood-resilient farming methods and also to early warning information through interventions that targeted their involvement in farming and in managing early warning messages. **Mercy Corps** reports that its target of 30% female project beneficiaries was exceeded, with the final percentage being 50%. The main driver to achieving this was accommodating women's needs in the design of activities and also designing activities specifically for children.

Improved information access

A central thread to strengthening resilience among beneficiaries is the provision and spread of information, which includes early warning messages, disaster response knowledge, and farming productivity advice. As a result of project activities, **LWR** reports that more than 84,000 households have access to real-time information to cope with and prepare for monsoonal floods; 10,756 people have access to community-based information as result of the activities of **Mercy Corps**; and the further expansion of AtmaGo will continue to spread this information. This type of information is used to help households plan responses to disaster, while **Seacology**'s work has helped recipients of microloans improve their businesses through access to information about business planning. The other key area of information outcomes relates to the spread not only to direct beneficiaries but community-wide. **Mercy Corps** and **Practical Action** both report how wider community members and institutions are using information generated through their projects.

Policy influencing

Information sharing is reaching beyond community level, with all scaling projects reporting influence of learning on local and national action. **Mercy Corps**, **DRC** and **LWR** all provide evidence of how sharing learning and building strong partnerships has resulted in inputs to programming and planning, with the government asking **LWR** to replicate its project in another area, **DRC's** work strengthening government planning and **Mercy Corps'** forum members providing inputs to planning and decision-making about the watershed. **Practical Action**, **Seacology** and **Mercy Corps** have also seen policy influencing outcomes, with **Seacology** reporting that its work has influenced the national-level policy commitment to protect all mangroves in Sri Lanka. As well as advocacy outcomes at government level, **Mercy Corps** reports important outcomes in terms of shifting awareness of the environmental impact of property development in the private sector.

One of the key drivers for these outcomes relating to influence on programming and policy is that of improving coordination, communication, and community engagement. Outcomes relating to the creation of forums for discussions, task force groups, partnerships with the private sector, local partners, and research institutions are demonstrated through all scaling challenges. Development of partnerships and stakeholder engagement is one of the key drivers for many of the outcomes, with **Mercy Corps** stating that starting with a stakeholder mapping to understand community dynamics helped steer activities to encourage participation in the project. And these coordinated groups are linked to further beneficial outcomes, with **LWR** for example showing how its CDMCs self-organized during flooding, and the legislation of **Mercy Corps's** Transboundary Forum resulting in influence at local government level and increased social bond between communities.

5. Progress along Impact Pathways

While the previous section focuses on outcomes for scaling grantees, this section looks across all grantees at the activities they have undertaken against the Impact Pathways, including any outcomes, enablers and challenges.

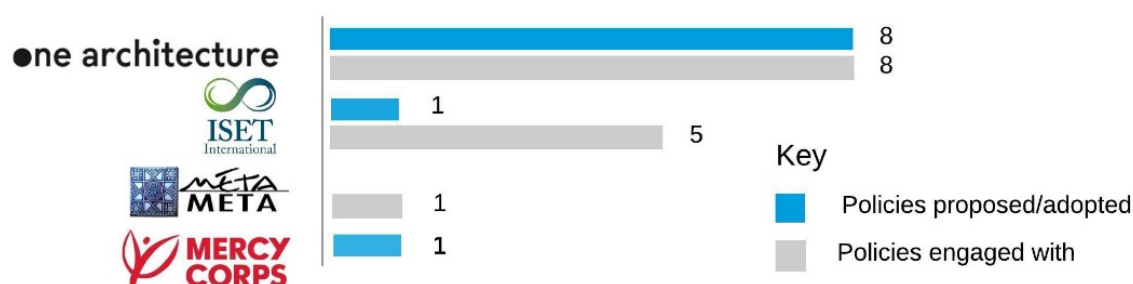


5.1 Impact Pathway 1: Policy Influencing

Engaging with and influencing local or national policy played an important role in the projects. All grantees engaged with policy and policy-makers, even where it was not a main focus of the project. The mechanisms through which they did this highlight the need to step beyond surface engagement (e.g. simply having a meeting with someone) to finding ways of engagement that are of interest to key stakeholders and produce positive outcomes for all parties (e.g. meeting with local governments to support them in the development of their own EWS).

All of the grantees have experience of **engaging with particular policies**, with some grantees **proposing and adapting national or local policy**, as well as influencing private sector decision-making. Of those that chose to report on this indicator, **One Architecture** reports the highest number of policies engaged with and also proposed/adopted.

Figure 5: Policies engaged with and policies proposed/adopted



Engaging government to influence policy is something that all grantees did. This engagement ranges from meetings and workshops to collaboration over policy documents. **BRAC** held workshops to bring policy planners on board at the start of the project, and then followed this up with district workshops and meetings with policy planners. Some grantees carried out workshops with a particular focus, such as **LWR**, which convened a number of workshops aiming at educating government and peer stakeholders on the need to strengthen EWS in India and Nepal. **LWR** also interacted across borders, working with both Indian and Nepalese line ministries, engaging with relevant projects on either side of the border, and collaborating with government programs. This interaction included the use of LWR project materials in their disaster management plans and allocation of budget toward DRR.

“These relationships created a conducive environment for working closely with relevant organizations in both countries and provided opportunities for project implementation with them.”⁵⁴

⁵⁴ LWR FNR, p. 11

LWR recognizes that this kind of policy influencing takes time, and, despite an MoU signed with DHM in Nepal, there is a need to embed these partnerships further to influence policy.

Similar recognition of the time it takes to influence policy came from **ISET**, which engaged with key policy-makers on a decision to be made on a policy governing drought and flood management. The timing of the project was important in that it coincided with governmental consideration of the best ways to establish river basin organizations. Consequently, the government used lessons learnt from ISET's setting up of the Vu Gia-Thu Bon River Basin Organization. As such, during the time span of the project, engagement in these discussions was started, and a final workshop saw commitment from key stakeholders to continue working together on this issue. So, although the policy has not been changed, the work of **ISET** has influenced discussions around it, leading to future action.

Efforts at **advocacy** were also recognized as taking time. **Potsdam University** promoted the needs for ecosystems-based adaptation (EbA) and in particular for women to be central in disaster risk management (DRM) in coast and urban areas.

One Architecture has also started advocating for policy change with key government institutions, using leverage through the interest of the Philippine Reclamation Authority in expanding its mandate into coastal protection. This working partnership has resulted in a shift in attitudes of key policy-makers away from reclamation toward a resilience approach to coastal protection (see Box below).

One Resilient Team: private sector-led policy engagement to combat flood risk in the Philippines

Annually, typhoons batter the Philippines, but the replanting of proper mangrove species can help lessen the effects of these storms. In 2013, Typhoon Haiyan hit the Philippines, killing over 6,000 people. Diosdado Dagandan was in his garden in Nula-Tula, near Tacloban City, when Haiyan hit. He remembers hearing a loud sound and then seeing the big wave just before it reached his house: "I went straight to our house and grabbed my wife. I told my wife, 'We need to get out of here or else we'll be dead.' I really saw a huge wave coming. Right after we got outside our home, in just less than 5 seconds, the wave was already there and the water kept on rising quickly." Dagandan was able to swim, holding onto his wife, and they both survived.

One Architecture & Urbanism, a firm based in New York City and Amsterdam, is collaborating with its partners, the Philippines Reclamation Authority, the Asian Institute of Management, and Wetlands International as "One Resilient Team" to combat flood risk in the Philippines. The project began in 2017 and takes place in Tacloban City, an area that was devastated by Typhoon Haiyan. Flood risk in Tacloban is exacerbated by gaps in the coastal green belt, and in the wake of Typhoon Haiyan the experiences of people in coastal communities urged the local government to see the value of mangrove forests. The project is implemented and led by local government partners in close coordination with community leaders. Local empowerment supports inclusive decision-making and ensures the perspectives of vulnerable communities are taken into account.

Wetlands International recently reported that although mangrove planting is hugely popular, many efforts fail to establish sizable, diverse, functional, and self-sustaining mangrove forests due to weak or no involvement of the community, mono-species planting, and poor choice of location. In the Philippines, mangrove-replanting efforts are particularly extensive and have received millions of dollars since Haiyan. Activities have focused on replanting existing mangroves on the seafront, which are seldom successful,

because planting takes place in water that is too deep or the species used are not typhoon resistant, but popular and easy to propagate and plant.

This is a dark side of mangrove restoration and rehabilitation that is rarely talked about as money is wasted on non-sustainable, non-typhoon resistant, non-culturally specific mangrove-replanting efforts. Arne Jensen of Wetlands International says: “There is a learning curve here, if you try to adopt or copy nature – planting the right front species – it will survive. But if you manipulate nature and choose the wrong [non-typhoon-resistant] species, then there is almost a 100% guarantee that when you have a strong typhoon like Haiyan, it will die and not recover.” These quick-fix replanting efforts are driven by budgets and seedling targets and will not enhance coastal protection.

The One Resilient Team actively engages in a process of science-driven mangrove and beach forest restoration. The local government works together with civil society and academics who support the proper planting of mangroves leading to sustained results. They also aim to restore abandoned fish ponds by replanting mangroves. The reversion of fish ponds is controversial because of its tenurial aspects, with tenure either held by private actors or a variety of government agencies having various, sometimes overlapping, mandates. However, reversion is needed to fill the gaps in the coastal greenbelt. According to Dr. Jurgenne H. Primavera, chief mangrove scientist advisor for the Zoological Society of London–Philippines, the One Resilient Team may have implemented the first successful fish-pond reversion to mangroves in the Philippines.

The team has gained several insights from the implementation of three pilot project interventions through documenting challenges and opportunities, which can help enable scaling and wider implementation of their approach. The main success of the project so far has been identifying the barriers in the local governance hampering restoration efforts such as jurisdictional conflicts, other agencies undertaking poor replanting measures, and tenurial issues in securing sites. Another apt lesson learnt is the importance of flexibility and willingness to adapt as opportunities arise, which is combined with the practice of cataloging complications and unanticipated challenges. This is particularly crucial in the unpredictable and complicated climatic context of Tacloban, evidenced by the myriad shocks and stresses taking place during the project period.

One Architecture & Urbanism and its partners are carefully documenting challenges and lessons learnt from their efforts to improve planting and coastal protection strategies moving forward. The project aims to resolve government relations in coastal protection by documenting common challenges, unique conditions and procedures, and gaps in processes. Through this systematized learning process, local partner capacity can be improved to better implement green belt restoration in Tacloban and beyond.

Source (adapted from): <http://www.globalresiliencepartnership.org/news/2018/09/14/one-resilient-team-replanting-mangroves-to-combat-flood-risk-in-the-philippines/>

Building on the interest and existing movement within governmental systems is another important way of influencing policy. **Mercy Corps** found that having a government agency as a main partner played a major role in its advocacy strategy.

Another important mechanism used to influence policy is through the **use of project learning and evidence**. Grantees found this to be a successful way of engaging with policy-makers and decision-makers, using evidence of projects outcomes to demonstrate options for change, or helping them gather or access the evidence policy-makers need to make decisions. **DRC** used evidence from project successes to advocate at local government level for a budget to be allocated to ensure the implementation of policies to build resilience. It also used evidence from their project to advocate for further changes to DRR policies. **ISSET** drew lessons from the establishment of Vu Gia-Thu Bon River Basin Organization to discuss

with key national stakeholders, thereby influencing forthcoming national policy on river basin management. **Mercy Corps** influenced both government and private sector decision-makers with evidence about the results of construction on the watershed, resulting in changes to implementation planning from private sector companies. **Potsdam University's** coastal project shared the positive cost-benefit ratio of mangrove planting with strategic provincial policy-makers. It also collected data in urban and coastal areas to fill gaps highlighted by policy-makers, thus raising its profile and demonstrating the value of EbA.

Mercy Corps in particular used **organizational structures** to help influence policy, with the legalization of the Garang Watershed Management Forum, which gave the Forum formal authority to design and decide on project planning. This was an extremely important mechanism of change for the project, providing a way of not only bringing stakeholders together but also influencing. Without the Forum's legalization, the same level of influence was not possible. Mercy Corps also set up informal community groups that were supported to develop their own DRM documents and plans based on these.

LWR helped the Indian and Nepalese governments prepare their policy documents on DRR and early warning using evidence from the project. **ISET** helped create a document to strengthen collaboration between Da Nang and Quang Nam provinces, which jointly manage the Vu Gia-Thu Bon river basin, and **MetaMeta** had its Polder Development Plan endorsed and taken on by key government departments. **Potsdam University** is seeing success through demonstration, where "the aim is to prove EbA as a concept and include it in official policy management. This has already been achieved in the urban area where the project assisted the Disaster Management Center (DMC) to include EbA as a topic in DMC's adaptation plans."⁵⁵ It has also already achieved its key policy goal of establishing the role of the Water Unit in the urban DMC, which was put in place through a joint agreement with the latter. **Seacology** has been working with the policy commitment of the Sri Lankan government to protect all of the country's mangroves and the project is adding evidence and support to put this policy into practice.

As well as working to influence policy, grantees provide us with evidence about the policy changes that are needed to keep their work going forward. These are sector specific, with **BRAC** saying there is a need for a national housing policy to provide guidance on building flood-resilient houses, **Practical Action** wanting government support for the development of the mud crab industry, and the **University of Waterloo** stating that the flood management policy will need to shift to a position in which it is considering a more ecology and "living-with-floods" approach before amphibious housing can become more widespread. These are all quite high-level policies, which supports the other evidence that grantees are managing to influence or work with many of the policies that are directly relating to their project.



5.2 Impact Pathway 2: Finance and Investment

The main mechanisms reported by grantees in relation to finance and investment are mobilizing new funds and identifying investment opportunities. There is a considerable difference between grantees, with some having mobilized large new grants, while others are continuing to look for new investment opportunities. Demonstration, sharing of learning, and stakeholder buy-in all enable the mobilization of new funds. This IP links closely to IP3, Innovation and Scaling.

⁵⁵ Potsdam Uni SVR, p. 4

Six of the grantees report having mobilized new funds, with the majority reporting that they were using it for scaling-up or the next phase of the project. Funds mobilized ranged from US\$120 to \$1,000,000 and the sources from community groups to international donors. Donations in-kind were also given, with the sub-county Department of Livestock contributing grass seed to **DRC** to contribute to pasture reseeding activities and significant in-kind investment of staff time and resources in the **One Architecture** project from the Philippines Reclamation Authority. **Seacology** also received a donation of government land to construct a training center.

Figure 6: Investments mobilized by GRP grantees (USD)



Mercy Corps mobilized funds from the widest range of sources for a number of small-scale pilot interventions at the village level. Funds came from their partner, from the private sector (a housing developer, which made a flood risk investment, and Coca Cola, which donated saplings) and from the government. This included payments for tree planning, eco-tourism development, building of a waste disposal shelter and drywell replication as well donations. The project also mobilized funds from beneficiaries. Reporting shows that the approach of collaborative community-level working, with shared aims and co-produced plans and activities, resulted in full commitment in the project from communities.

“As a result, the village government invested in various shared-funding activities with both the village government and communities wanting to allocate funds for watershed protection activities. The end line survey reveals that 61% of community members are willing to propose more budget allocation for watershed conservation activities during the next budget planning process ... Even though these initiatives are still small in number, they have huge potential for scale-up.”⁵⁶

LWR also mobilized funds from a wide range of sources, including civil society, the public sector, an international NGO and their partner. The funds are to be used for replicating the approach in other areas, as well as upscaling and further partnership work and developing the project through piloting new approaches.

ISSET’s work is to be linked to a project funded by the Global Environment Facility (GEF)/United Nations Development Programme (UNDP) through the Vietnam Environment Administration. As well as mobilizing funds to explore the potential of taking the model to the Amazon River Basin, **BRAC** have developed a plan for the second phase of the project and prepared a proposal to submit to identified investment opportunities. **MetaMeta** is going to be building on its partnership with Blue Gold, which has put finance aside to support further water interventions for roads, which have prompted a large volume of applications from local water management boards. They also have some large-scale investment opportunities identified, through potential to be involved in large-scale World Bank Green Roads Initiative

⁵⁶ Mercy Corps FNR, pp. 56–57

in partnership with the Local Government Engineering Department and in the national Department of Agricultural Extension program, as well as conversations happening with the World Bank and the Asian Development Bank.



5.3 Impact Pathway 3: Innovation and Scaling

Innovations are being seen in relation to technology, organizational systems, agricultural techniques, and stakeholder-led ideas in particular. Grantees report a wide range of opportunities to ensure sustainability as well as steps being taken to scale up. Common to many of these is the need for strong partnership working, community trust and uptake of ideas, using learning to build on and ensure sustainability.

Types of innovation

As we have seen, grantees have developed a wide range of interesting approaches to the challenge they are trying to address, with innovative approaches being made in relation to technology, agriculture, flood-resilient infrastructure, and organizational approaches. There are also elements of stakeholder-driven innovation.

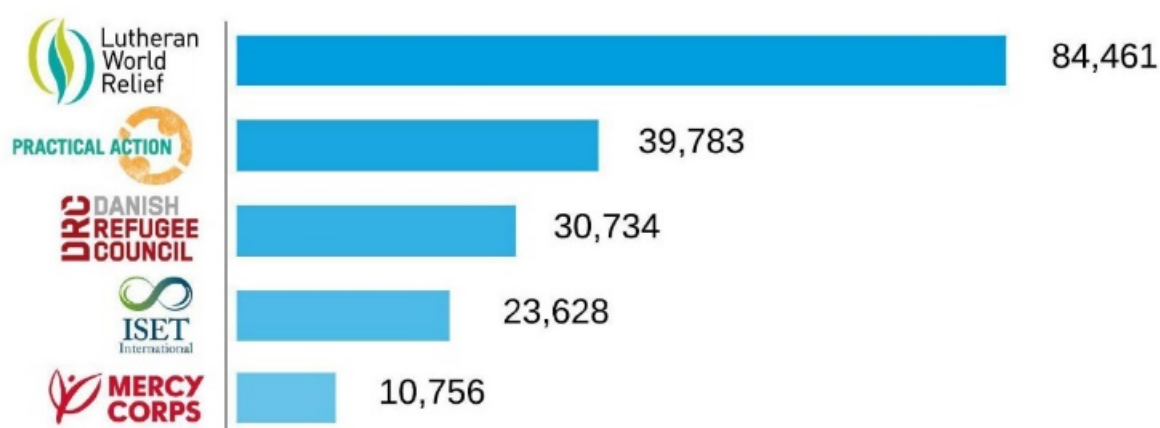
Technological innovation

In terms of **technological innovation**, **BRAC** and **University of Waterloo**⁵⁷ are the most obvious examples of innovations in design, developing, as they did, different versions of resilient floating homes. **BRAC** used a range of different technologies, including solar panels and wind turbines, harnessing academic expertise alongside stakeholder consideration to design and build three houses that are “environment-friendly, floatable, earthquake resistance up to rector scale 8, resilient against three types of cyclone and an insulator to lightning.” [FNR, 3-4] The **University of Waterloo** completed the retrofit of two amphibious houses, and are completing two more. Once again, the combination of academic research and expertise along with local knowledge, understanding of needs and context and local construction expertise were important drivers to the success of this project.

A number of grantees have used **digital technology** in relation to EWS or climate information which has been widely used by beneficiaries (Figure 7). **Mercy Corps** successfully trialed a digital tool to model and predict results of land use change. They also identified the most effective mechanism (an app) for digital sharing of DRR information, and developed a new functionality for the app which can now be used in other areas.

⁵⁷ See here for videos about these projects: <https://www.youtube.com/watch?v=ATYoUF9XI-A&t=207s>

Figure 7: Users of EWS or climate information



Organizational Innovation

As we have seen, partnership and finding positive ways of working with stakeholders has played an important enabling part in the achieving of outcomes, and in so doing, grantees have developed a number of different organizational innovations. These **organizational innovations** range from identifying methods and settings to bring together people around a shared area of interest (**ISET, LWR, Mercy Corps**), to the creation of settings which facilitate inclusion of marginalized groups (**Potsdam University, Seacology, LWR, Practical Action**). Some of these new structures have clear roles, such as CDMCs creating disaster relief plans (**LWR, DRC**) and CBOs to support training and disaster preparedness (**Seacology**), while others are places for discussion and important settings to bring people together and support engagement (**Mercy Corps, ISET**).

Many of these organizational innovations also involve influence on **legal and policy** structures. By working together with local and government partners, **Seacology** has had a major influence on an innovative national strategy to conserve all of Sri Lanka's mangroves. This innovative policy is being shared globally and lessons are being learnt from the approach taken by **Seacology** in influencing this approach. **One Architecture** introduced innovative recycling and vermicomposting to local government waste management programs. **Mercy Corps** not only created an innovative organizational structure in the Garang Watershed forum, but worked to ensure it had legal status, an additional element of the innovation that was crucial to it achieving desired outcomes.

Innovation in agriculture

Many of the grantees (**DRC, BRAC, LWR, Practical Action, Mercy Corps**) used **innovative approaches in agriculture** to help farmers become more resilient to flood, with DRC using a range of different techniques including natural alternatives to pesticides and chemical fertilizers, introduction of no or low-cost farming solutions to improve irrigation and pest control, and the planting of tree nurseries to continue afforestation among others. The grantees mixed different methods and worked with farmers to consider which ones are better accepted. In so doing, a number of stakeholder innovations emerged, with **DRC** farmers making their own versions of shade nets using locally available materials and **Practical Action** farmers adapting sack gardening approaches to cope with waterlogging and salinity. Building on the work done by **BRAC** with their flood-resilient homes, 16 households learnt from the approaches used and were then supported to put in place their own innovations.

Innovation in infrastructure

Finally, **infrastructural innovation** was particularly obvious from **MetaMeta** and **DRC**, with MetaMeta developing innovative designs for improved water management through polders⁵⁸ which is being adopted and spread more widely across Bangladesh, and DRC building an earth dam to harvest flood run-off for crops and livestock, and building with nature through mangrove and beach forest restoration projects (**Seacology**, **University of Potsdam**, **One Architecture**).

Opportunities to sustain results

The discussion around sustaining results relies to a large extent on how the projects interact and work with other stakeholders. Key themes relate to community support and partnership working, as well as ideas about how the expansion of projects may allow for sustainability.

Community participation and partnership is the most important element across most of the grantees in ensuring results are sustained. **BRAC** employed a number of activities within the project to promote the sustainability of its flood-resilient houses, including using locally available materials, working in a participatory way, building capacity of local people to construct and maintain the houses and delivering livelihoods and entrepreneurship training. Training was also important to **DRC**, **Mercy Corps** and **Seacology**, which all provided training to community organizations in different skills to ensure capacity to continue the projects.

However, before getting to the stage where communities are trained to sustain a project, all of the grantees emphasized how important the participation of community is in project design and implementation. **DRC** ensured that community technologies (seed production and traditional weather forecasting methods) were not overlooked, and that new ideas and technologies were brought in to complement rather than replace traditional ones. This helped achieve higher levels of trust and sustained use of the ideas. **Mercy Corps** only put into practice pilots that were prioritized by community forum members as being relevant. **Seacology** changed its mangrove-replanting strategy based on feedback from a WU member that fishing families would be troubled by the proposed design. **One Architecture** ensured that livelihood components of the project were redesigned using community feedback and **Practical Action** monitored motivation of beneficiaries to ensure it was meeting the needs and interests of the community.

Stakeholder buy-in to a certain extent includes community participation, but grantees provide evidence of how wider stakeholders can influence sustainability through engagement either in the project or in wider policies or programs that affect the project. Examples of this wider, more external, influence come from **Seacology**, **DRC**, and **ISSET**. **Seacology** can see how the Sri Lankan government's commitment to the protection of all mangroves will have a positive influence on the sustainability of its work. Similar "buy-in" to a policy that will influence sustainability of the project is recognized by **DRC**, which reports that integration of climate change as a key part of government development strategy in the area offers opportunities to scale up successful sustainable water harvesting and dryland agriculture practices identified during the project. One of the community leaders in an area where **University of Waterloo** is working stated how he had seen the potential for amphibious housing to form part of a sustainable solution to flood management, allowing for expansion of flood-resilient agriculture, and the development of tourism.

In terms of direct project partners, their commitment to working together can also be of central importance, as highlighted by **DRC**, which recognizes that, by working together, **DRC**

⁵⁸ A polder is low-lying tract of land enclosed by dikes that form an artificial hydrological entity, meaning it has no connection with outside water other than through manually operated devices

together with the Norwegian Refugee Council (NRC) and Lotus Kenya Action for Development Organization (LOKADO) have made something “innovative, because individually, the team members would provide a one-off solution to flooding whereas jointly the team is working towards provide a longer-term sustainable solution to floods.”⁵⁹ And, at beneficiary level, recognizing that farmers are adopting and even adapting new technologies, as **DRC** and **Practical Action** have seen beneficiaries doing, is a sign of beneficiary level buy-in. **LWR**, **Seacology**, **Practical Action** and **DRC** also report that non-beneficiaries are also adopting practices, having had the information shared by direct beneficiaries.

Many of the projects consider elements to ensure sustainability. For example, **Potsdam University's** ResilNam has an eco-tourism component that has the potential to become a source of income for local communities, as well as a microfinance program that offers women in coastal areas microloans for livelihoods, presenting alternative income options to cutting mangroves.

Opportunities to scale up

Very similar themes emerge in relation to opportunities grantees find to scale up, with community and stakeholder involvement being key, alongside the creation of organizational support to facilitate scaling and further development of the approach.

In terms of evidence of how **community uptake and involvement** can facilitate scale-up of an idea, **DRC** found that farmers took the idea they were given and made it cheaper and more usable in a way that produced rapid scaling:

“The shade nets were installed in August 2017 by a locally based artisan in Kakuma who provided training to the farmers on how to correctly install the shade nets. By training local farmers, the project facilitated the transfer of skills that may in future aid the scaling of the intervention ...”⁶⁰

Mercy Corps responded to requests of communities that wanted to replicate within their own setting, and the **University of Waterloo** found that local carpenters who had been involved in the project were keen to replicate the retrofitted amphibious houses elsewhere. In a similar way, **BRAC** considers that whole community involvement in the conversations and effort around the building of the flood-resilient house will “ignore the diffusion of modern technology at the local level and develop new business ventures for local people to upscale the proposed flood-resilient housing across the scale.”⁶¹

This community uptake evidences elements of **knowledge sharing**, and the grantees all demonstrate that they understand and appreciate the importance of sharing the outcomes of their work with other stakeholders. **ISSET** and **Mercy Corps** are proposing to share learning with each other, with a funding proposal having been submitted to have Mercy Corps visit Vietnam to share its experience of working in the Semarang River Basin and to learn from **ISSET's** work in Vietnam. Aside from this unusual but exciting inter-project approach to sharing learning, **Mercy Corps** is using a range of different techniques to share learning nationally and internationally, and its partners are working to scale the digital tools building on learning from the project. Furthermore, **Potsdam University** has policy-makers in other areas of Vietnam using ResilNam data to improve their understanding of EbA approaches to flood resilience.

⁵⁹ DRC Final SVR, p. 3

⁶⁰ DRC FNR, p. 10

⁶¹ BRAC Final SVR, p. 4

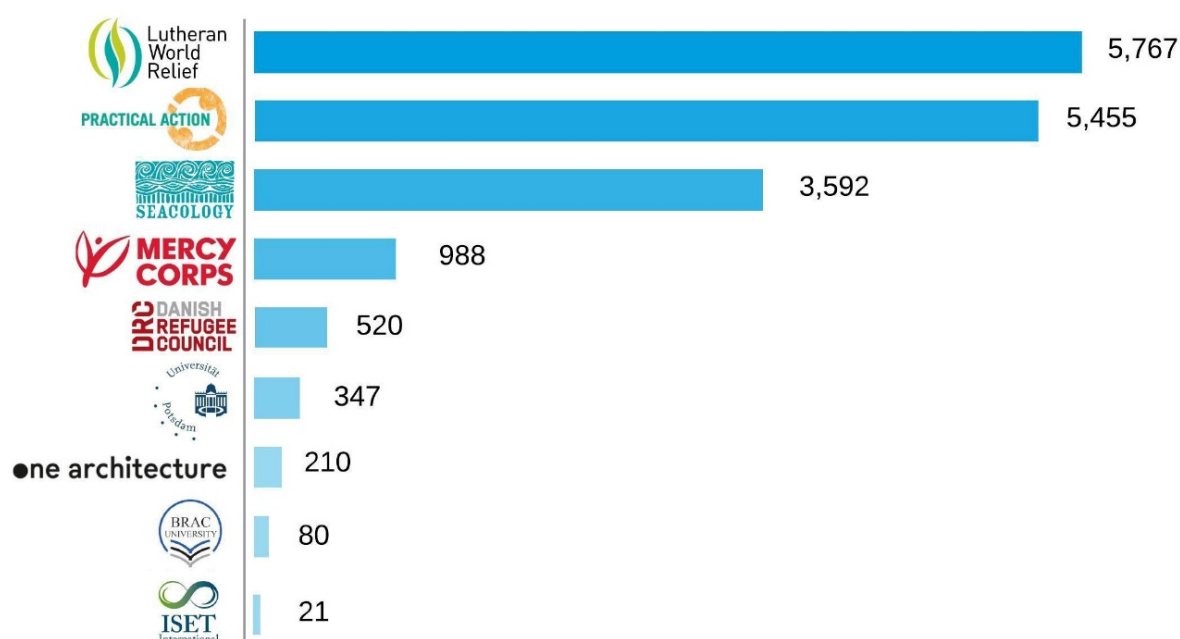
Sharing knowledge and learning plays a key role in ensuring that the engagement of government stakeholders goes beyond simple engagement to being something that can facilitate the scaling-up of a project. Many of these elements are similar to those relating to IP2, as influencing policy is often a form of scaling for a project. **MetaMeta** is working with key government departments to ensure they can use the learning from the project to ensure polder management is considered in road and infrastructure projects in other affected areas of Bangladesh. **LWR** is working with the government of Nepal to replicate the project in another area.

Finally, the grantees have a range of different plans and ideas for taking their projects further, many of which relate to building on partnerships. These include setting up a network of mangrove nurseries to foster secure livelihoods and strengthen working relationships between key government bodies involved in coastal protection (**One Architecture**), use the local government's eco-tourism policy to drive the spread of mangrove planting (**Potsdam University**) and build on networks already set up to strengthen public-private networks in river basins to support future transboundary EWS (**LWR**).

Steps taken to scale up (activities)

Having identified that many of the opportunities to scale up relate to community involvement, partnerships and knowledge sharing, it makes sense that the activities actually undertaken to scale up focus on community engagement, partnership with other organizations, and setting up replications in other settings. Engaging communities in order to ensure scaling often happens through training (see Figure 8).

Figure 8: Number of people trained



BRAC has trained community members to be able to sustain the project's outcome and established a management committee that can carry out further training. **LWR** trained 5,767 people in a range of activities relating to EWS and disaster preparedness as well as sustainable livelihood options. **Seacology** worked with its partner Sudeesa to provide it with the training and tools it needed to continue managing CBO relationships and mangrove conservation after the project ends. In terms of scaling the microloans element of the project,

the CBOs are then in a position to manage the loan structure, and are given training to be able to continue to create opportunities through microloans.



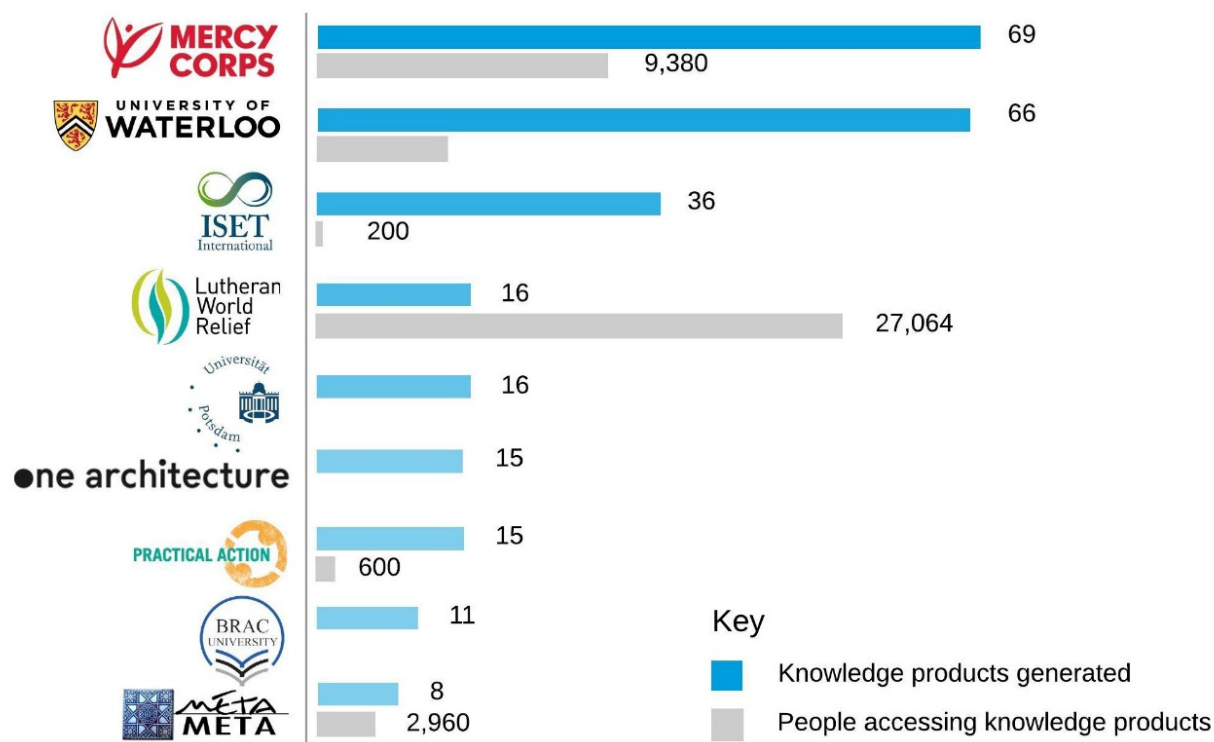
5.4 Impact Pathway 4: Knowledge and Partnership

Knowledge and partnerships are important contributors to project delivery with knowledge sharing and project learning contributing to the development and sustaining of partnerships. Partnerships are central to the delivery of successful outcomes for all grantees. Partnerships have been built with a range of stakeholders and on different levels, but they are all of strategic value. Grantees emphasize the importance of placing resources into the development and maintenance of these partnerships.

Knowledge

While the indicators report the numbers of knowledge products generated, the narrative reports outline the very wide range of different types of products developed by the grantees (Figure 9). These range from blogs and newspaper articles to full video reports for television, training manuals, academic articles, and conference presentations. **Mercy Corps** in particular has produced a huge range in its 69 knowledge products, including 12 online and 11 printed mass media publications, and the delivery of roadshow village visits, field school training, education events for students and resilience talks.

Figure 9: Knowledge products generated and people accessing knowledge products



The question of whether or not people are accessing knowledge products is a difficult one. Most of the grantees report on the numbers accessing their products, and then there is evidence of how the knowledge products have been used, through workshops, trainings and presentations, with grantees knowing that those in attendance will have used the products.

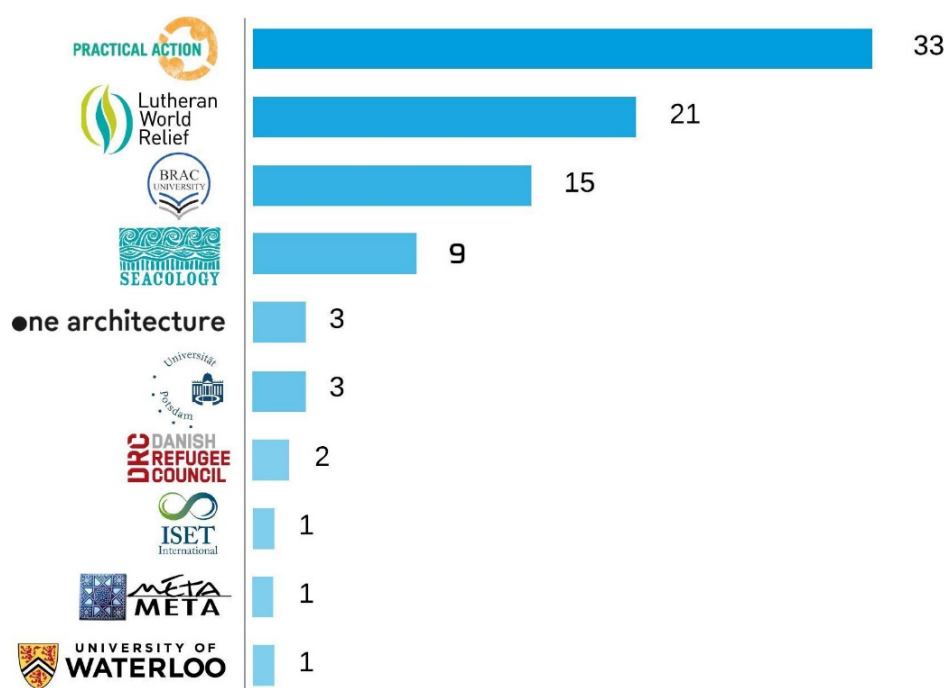
Partnerships

As with the range of knowledge products produced, the range of organizations receiving assistance through the grantees is wide. These include women's associations, individual market trainers, schools, cooperatives and youth organizations as well as local government agencies and local NGOs. Feedback about partnerships shows that all grantees have created successful partnerships at government level, as well as with research institutes and non-governmental and community-level organizations.

In relation to partnerships with other organizations, the grantees have built on and used their partnerships to ensure sustainability and also scaling of their projects. This is often through sharing of the project knowledge and learning. **Mercy Corps** have successfully used evidence and governmental partnerships to engage with and influence the decisions of private sector actors, thereby scaling up project learning to have influence elsewhere. Similarly, **MetaMeta** have used joint consultations and workshops to gain consensus among key stakeholders on best practice in infrastructure and water resource management, which will now be adopted more widely. **DRC** reports how external institutions have scaled up the project interventions, leading to increased adoption of sustainable water, harvesting and dryland agricultural practices throughout the sub-county. It also reports how its work with partner organizations NRC and LOKADO on the COFREP project has led to the co-development of a 10-year vision for community resilience in Turkana West. The overall strategy will form the foundation for future resilience work in other arid and semi-arid regions and countries.

Another example of partnerships leading to scaling in other settings comes from **Mercy Corps**, which, as lead partner of the advocacy workstream under the Zurich Flood Resilience Alliance, is developing a new flood resilience advocacy project, which will be partly building on Semarang experience. The new project will focus on Bangladesh, Indonesia, and Nepal. It is also trialing the Ecosystems Services Identification Inventory tool for modeling and predicting results of land use changes in other locations and countries, after the success of the TRANSFORM project.

Figure 10: Partnerships formed



The range shows the innovative approaches that grantees are taking in developing their projects, with **DRC** adding to its project by creating a partnership with a farmer-to-farmer information-sharing platform – WeFarm – which has allowed for easier dissemination of weather information; and **LWR** signing a letter of intent with the International Center for Integrated Mountain Development to establish an EWS. **LWR, MetaMeta, Practical Action, and Mercy Corps** all report successful and influential partnerships with the private sector. Finally, the success of the project for **Seacology** in Sri Lanka has enabled it to take concrete steps toward a similar project in the Dominican Republic.

Seacology: partnership and women empowerment help Sri Lanka protect its mangroves

Mangrove forests protect coastal communities from floods and provide livelihoods, resources, and many other functions, but they are one of the world's most threatened ecosystems. Across the globe, different initiatives are now working to secure these vital watery forests, which include mangrove-replanting projects of Seacology & Sudeesa, One Architecture, and ResilNam – all supported by the Water Window Challenge.

The Sri Lankan government has partnered with Seacology and Sudeesa to launch an innovative and historic effort to make Sri Lanka the first nation to fully protect all of its mangroves – the goal is to create a green belt of mangroves around Sri Lanka. To do this, the partners are taking a three-pronged approach that: (i) incentivizes women to replant and protect mangroves; (ii) provides micro-credit to improve livelihood options; and (iii) trains women to understand the role a healthy ecosystem plays in building resilience.

On a global scale, mangroves are essential in combating the effects of global climate change. They absorb up to 50 times more carbon than any other type of ecosystem. They also act as a natural buffer against flooding and can reduce the force of storm surges. Dense, healthy mangrove forests can decrease the height of waves by up to 66%. Mangroves also act as a breeding ground for fish, prawns, and crabs. They provide both ecological and economic benefits for coastal communities, who use the mangrove forests for shade, fishing, and collecting firewood.

In Sri Lanka, mangroves have been cleared for increased coastal development. In the northern part of Sri Lanka, much of the mangrove forest was destroyed during the 1983–2009 civil war, in government efforts to stop the Tamil tigers from hiding in the dense vegetation. On the west coast of the country, mangroves were destroyed to make way for shrimp farms. In addition, coastal communities cut mangrove poles for construction or for charcoal production. The removal of mangrove ecosystems has had far-reaching economic, social, and environmental impacts, especially for the poor as they are more dependent on these ecosystems for their livelihoods and well-being.

Meanwhile, Sri Lanka faces annual monsoons and heavy inland flooding. Floods cause more damage worldwide than any other type of natural hazard and cause some of the largest economic, social, and humanitarian losses, accounting for 47% of all weather-related disasters from 1995–2015. Flooding has often been dealt with through structural measures such as dams, dikes, and reservoirs with concrete seawalls. These expensive, single-focused approaches tend to be driven by top-down governance that does not consult local communities, and they often have negative impacts on the environment, including on fisheries and access to fishing. Moreover, such structural methods are failing to cope with increasingly unpredictable weather patterns and rising sea levels. A more inclusive method of limiting flood impacts that works with the local environment and local people is needed.

To meet this need for new approaches to combat the problem of increasing flooding, Sudeesa and Seacology are working to protect and restore mangroves, and educate communities, school children, and even tourists about the importance of these ecosystems. The partners are working to create a transformation in how mangroves are seen and managed, by focusing on the importance of healthy, thriving mangrove ecosystems. They also provide a space for inclusive decision-making in the communities. The goal is to help build the capacity of women to protect and restore mangroves. In doing so, the communities are enhancing and promoting the ecosystem functions of mangroves, which provide environmental benefits and contribute to coastal protection, livelihoods, and well-being.

To replant and protect mangroves, Sudeesa and Seacology engage local women. Women are disproportionately affected by flooding compared with men, not just in Sri Lanka but also globally. They commonly experience more social, cultural, economic, and political disadvantages that can result in higher mortality rates during floods, and higher poverty rates after floods due to more unemployment and the lack of legal rights such as land ownership. The project started in 2015 and by 2020 it will have trained 15,000 women in a five-day training program that covers mangrove conservation as well as how to develop a business plan and financial planning. Those who attend the training are eligible for a microloan to put their business plan into action. Through the training, the women join a community-based organization (CBO) or form one if one does not already exist. The women are also included in the decision-making processes in the CBOs.

The CBOs have the goal of protecting all the mangroves that surround the villages, and they represent 1,500 villages in 14 coastal districts in Sri Lanka. The mangrove-protecting and replanting activities take place through the CBOs. Women in the CBOs did not really understand the functions of mangroves before the program, but now they really see their importance. *“Before we used to cut down the mangroves for firewood, but not anymore. If anyone tries to cut down the mangroves, we will report it to Sudeesa – who will take action,”* says Niranjala Fernando who is a member of one of the CBOs.

The Sudeesa and Seacology project in Sri Lanka is also looking to become self-sustaining. The partners have built a mangrove museum, mangrove training centers, and mangrove nurseries. Protecting and restoring mangrove forests is a broader approach to combating flooding than hard infrastructure development and engineering solutions, such as building dams and dikes. There is no blueprint or one-size-fits-all way of doing it, but the example shows that with community participation, local and scientific knowledge at hand, the appropriate location and a self-sustaining model, this approach can provide a good foundation to build resilience in coastal communities.

Source (adapted from): <https://rethink.earth/building-resilience-one-mangrove-forest-at-a-time/>

5.5 Impact Pathway 4: Knowledge and Partnership

There are similar themes emerging through each of the Impact Pathways, with the key enablers to progress relating to partnerships and stakeholder engagement. The nature of these interactions and the extent to which they are placed as central to project plans is therefore an important consideration. This is especially the case for innovation projects, seeking to try something new. Gaining trust and cooperation, and building on local experience and knowledge, will help overcome concerns about new and complex ideas. Using demonstration and learning from the project is useful to assist in stakeholder engagement.

Along with describing the successes and the ways in which they had been achieved, grantees also considered some of the challenges they had faced and the lessons they had

learnt. This feedback is not extensive in the documentation; however, it is still worth considering commonality in grantee experience and lessons learnt for future projects.

The challenges identified by the grantees are likely to be shared, despite differences in context, given the commonalities faced in approaches and funding streams. They are also common to many projects seeking to use innovative approaches to provide solutions in other sectors.

The most common set of challenges relate to administrative problems, with grantees reporting the difficulties of dealing with organizations, delays, bureaucracy, funding and reporting systems. As is noted from the lessons learnt, what this demonstrates is the need for projects not to underestimate the time needed to administer and manage projects successfully. The relatively high number of grantees reporting that “social” elements are causing challenges is interesting, as these elements (partnerships, participation, stakeholder buy-in) are also mentioned as being among the most helpful enablers and also important outcomes of the projects. Again, the lesson learnt here is to not underestimate the importance of allocating sufficient time to make this work well.

Timing and flexibility are also needed in relation to trying out new technology, with time needed to allow for adaptation and consideration of local perspectives and alternatives as well as to work successfully with local government stakeholders. Finally, and potentially most importantly given the difficult climatic contexts within which these grantees are working, half of the grantees faced difficult climatic conditions during the project period. The ability to be flexible and adaptive in project planning is a key lesson relating to all of these challenges and something to be considered in relation to resilience projects in particular. This owes not only to the climatic conditions but also to the nature of successful resilience projects, which appear to layer different interventions and work closely with community interests, both of which bring added complexity and the need to be flexible.

6. Conclusions

The overall purpose of this synthesis was to take an evidence-based approach to summarizing the progress of WW grantees toward their stated outcomes. While there were no specific evaluation questions to answer as such, it was suggested that the synthesis be anchored around a two-part core question:

To what extent and in what ways have GRP WW grantees made progress toward building resilience? What have been the challenges and enablers to this progress?

In terms of **extent**, the ten GRP WW Challenges for which we have validated data support over 500,000 people across eight countries, the vast majority of whom are in Asia. Around 51% of those reached are women. The grantees have created at least 22 new partnerships, have enabled at least 189,362⁶² people to use EWS or climate information, and trained at least 16,920 people in the use of more resilient agricultural techniques, alternative livelihoods, and DRR. For many of the grantees, the time frame of this project means these numbers will continue to rise as they develop their work further building on the approaches they have tried and tested to date.

Challenges experienced are most likely to be in relation to administrative issues, but all of the challenges described revolve around the need for time and flexibility within project planning, management, and implementation. Innovation requires adaptive planning, and organizational systems often do not allow for the kind of flexibility required. This was experienced by grantees mainly in working with local government and other stakeholders. Alongside administrative challenges, social issues are also experienced as a challenge. This is particularly interesting, as social interaction/participation/stakeholder engagement is also described as a successful outcome as well as an enabler. When it works, it is of great benefit to the outcomes of the project, and this therefore reiterates the importance of ensuring stakeholder engagement is given adequate time and effort.

Enablers reported by grantees are very similar across the grantees, with the most common themes relating to partnerships and stakeholder engagement (Table 6). Reports from grantees once again emphasize that stakeholder buy-in helps the project from start to finish, building trust, capacity and support, and ensuring the intervention is needed and makes sense to people. If this occurs, then further down the line stakeholder engagement helps sustain the project, through people's commitment to ensuring its future and positive demonstration, which helps ensure future investment and scaling.

Table 6: Summary of enablers by Impact Pathway

Impact Pathway (IP)	Enablers
IP1: Policy Influencing	Demonstration; use of evidence and learning; effective partnerships and collaboration
IP2: Finance and Investment	Stakeholder buy-in; demonstrating and sharing learning
IP3: Innovation and Scaling	Creation, development and maintenance of effective partnerships; participatory approaches to implementation and design
IP4: Knowledge and Partnerships	Knowledge sharing, accessible information and demonstration; partnerships that facilitate process; gender and social inclusion; participatory approaches

⁶² This figure is based on the five grantees reporting against the indicator "Number of users of early warning system or climate information"

Partnerships and participation are necessary but not sufficient and a focus on how to make sure they are effective is critical. Grantees qualify what works and why when they talk of their involvement with partners and stakeholders, and unpicking what makes them work and why is key to the success of many of these projects. This is not least because it is also recognized that, though described as enablers, the time and difficulties involved in making them successful also means that such relationship-based elements of projects are also described as challenges.

One of the keys to successful partnerships often lies in working with people rather than “doing things to them.” For some working in the spread and scale of innovation, the most important approach is to move away from getting people to do what you want them to do toward helping people do what they want to do, and there is evidence of the success of this mindset among the grantees.

Grantees describe the importance of stakeholder mapping to really understand whom they are working with, and of building on existing approaches and understanding of context (**DRC, Seacology, BRAC, LWR**). Co-creation of plans is central to many of these projects, in terms of both community participation but also encouraging the involvement of local government and other key stakeholders.

Demonstration of success and sharing of learning are also important ways of engaging with stakeholders and gaining their trust. There are examples of people using learning evidence from their project to inform decisions to be made at local government and policy level, as well as sharing learning to be able to help stakeholders improve something they are working on (e.g. LWR helping improve the Nepalese DHM's EWS). This kind of reciprocal engagement increases trust and helps sustain stakeholder involvement.

This synthesis has shown that, although grantees have used a **range of different interventions and approaches**, there are common themes emerging as to *how* resilience is being built.

1. **Layering of interventions:** An approach to resilience building does not focus on one particular intervention; in most cases projects layer and sequence interventions which include activities to increase the resilience of livelihoods alongside access to information (EWS, training in DRR and preparedness) and infrastructure to decrease the impact of climatic events.
2. **Stakeholder buy-in/partnerships:** All of the grantees report that at the center of any success in their project is the engagement and commitment of the different stakeholders. This includes community participation and ownership, local government involvement, private sector engagement and wider government systems where relevant. The actions of these stakeholders hugely influence the outcomes of the projects, which would not be able to succeed without the commitment from key stakeholders.
3. **Creating and sustaining inclusive systems:** Many of the grantees describe an approach that focuses on women, with a focus on youth also emerging as important. They are using women's unions, creating CBOs focused on women and youth, developing approaches to capacity building that focus on the needs of women and youth and co-creating interventions with women as the focus. The outcomes are positive, with grantees reporting good results for women in terms of involvement in projects and outcomes.
4. **Knowledge of information sharing:** The importance of being able to spread information relates to achievement of project outcomes (e.g. reaching higher numbers with an easy-to-use EWS) as well as spreading information and learning about the project in order to achieve scaling. Therefore, finding ways of gathering information and sharing it successfully is an important project component. As well as the more traditional methods of knowledge sharing (papers, reports, presentations, etc.),

grantees are finding that demonstration is central to success, whether this means bringing local officials to visit a project, showing private sector actors the impact of their practice or having farmers demonstrate farming without pesticides to other farmers. In addition, grantees are using new technology, helping improve local information-sharing mechanisms, creating groups to generate and share information, and encouraging peer learning.

5. **Flexible adaptive management:** Given the difficult climatic contexts within which grantees are working, the ability to be flexible and adaptive in project planning and execution is crucial. This is a key lesson relating to all projects and something to be considered in relation to resilience projects in particular. This owes not only to the climatic conditions but also to the nature of successful resilience projects, which appear to layer different interventions and work closely with community interests, both of which bring added complexity and the need to be flexible. Time and flexibility are also needed in relation to trying out new technology, with time needed to allow for adaptation and consideration of local perspectives and alternatives as well as to work successfully with local government stakeholders.
6. **Sustainability and scaling:** Sharing of information, partnership building and stakeholder buy-in are instrumental in ensuring that projects are scaled up or achieve sustainability. Grantees recognize the need to invest time in these activities, but also that in the rush to deliver projects within short time frames, and within a traditional project management structure, the time and flexibility that should be invested is often lacking. However, they have all recognized where and how these successful partnerships have been developed and will continue to build on them going forward. In their plans for scale, most of the projects are demonstrating how they will be moving forward, hopefully building on the work they have achieved with their GRP Water Window grants.

The lifespan of the Water Window investment is relatively short in terms of evidencing impact on resilience. However, many of the projects experienced the climatic challenges for which their project was designed, and were found to be successful. In their plans for scale, most of the projects are demonstrating how they will be moving forward, hopefully building on the work they have achieved with their GRP WW Challenge Fund grant. In the same way that these projects have shown the benefit of sharing learning and partnership, GRP is well placed to continue giving them the chance to learn from each other, as well as being a platform for them to spread their learning and experiences globally.

Annex 1: Full project descriptions

This annex contains titles, descriptions, consortia leads and partners for each grantee project. Information was taken from <http://www.globalresiliencepartnership.org/>, supplemented with information from FNRs.

Floating houses: Community-Based Flood Resilience Innovations in Bangladesh

Consortium lead: BRAC University

Partners: BRAC, University of Dundee

Country: Bangladesh

Project type: Seed

Thematic area: Livelihoods, Infrastructure, Community participation



The Center for Climate Change and Environmental Research (C3ER) at BRAC University has tested community-led innovations that enhance the resilience of households and communities before, during and after floods. The project solution involved the design and testing of flood-resilient houses, and related integrated innovations such as water harvesting, cage fishing, and renewable energy using a community-based participatory process.

The team lived in the project area and worked collaboratively with communities to set up the project. This included participatory processes to design and build the floating houses in ways that capitalize on local skills. BRAC University's three floating homes and extensive training around them has directly supported 132 people in Bangladesh. The multi-functional homes have introduced technologies of rain water harvesting, biodigester recycling, aqua- and hydroponics, and renewable (solar and wind) energy to a remote community in the Shariyatpur district.

Key achievements:

- Three floating homes were built and handed over to the households:
 - They floated uninterrupted during flood and are resilient to earthquakes and storms.
 - The houses can produce a variety of food for dietary balance and nutritional security.
 - The house is supplied with renewable electricity sources and rain water harvesting.
- The home practiced co-design, facilitating technology transfer and building on the principles of sustainability and community driven decision-making.
- 80 stakeholders were trained in capacity building on flood-resilient homes.
- The flood-resilient homes have turned into a landmark tourist attraction of Shariatpur district, with people from all over the district and beyond visiting.
- Floating homes gained significant exposure in local and global media (e.g. BBC Bangladesh).

Community Flood Resilience Programme (COFREP)

Consortium lead: Danish Refugee Council (DRC)

Partners: Lotus Kenya Action for Development Organization (LOKADO), Norwegian Refugee Council (NRC)

Country: Kenya

Project type: Scale

Thematic area: Livelihoods, DRR, Refugees



The DRC has helped refugee and host communities in Kakuma, north-western Kenya, deal with flood-related shocks and stresses. The project has promoted proactive flood risk mitigation and adaptive technological responses, while harnessing flood water to expand livelihood opportunities. The project has also established an early warning system and shared expertise on the use of fast-maturing, hazard-resistant crop seeds.

DRC practiced a layered approach, putting in place several interlinked interventions to strengthen livelihoods and build community resilience to floods. The project resulted in multiple livelihood improvements, including improved provision of clean drinking water, increased agricultural productivity, and increased household income. Alongside these was the construction of water control and harvesting infrastructures, which both fed into the improvement of livelihoods while also transforming flood risk into livelihood opportunities. The project worked in a participatory manner with a focus on women, and practiced demonstration and peer learning to spread best practice.

Through training, EWS and installation of technologies such as road drifts, shade nets and trapezoidal bunds, DRC's Community Flood Resilience Project supported over 46,000 people. An independent evaluation concluded that the coordinated implementation of complementary and interlinked interventions supported the resilience of communities.

Key achievements:

- 46,138 beneficiaries receiving support from the COFREP project, including 1500 refugees.
- 24,000m³-capacity water pan constructed benefiting 13,214 people, 40,000 small herds and 10,000 camels.
- Repair of road drift serves an estimated 13,214 individuals to access Kakuma Market and other social services such as hospitals.
- The end term evaluation findings indicate that on average 84% of end-users are satisfied with the support provided: 76% satisfied with trainings, 93% satisfied with exchange visits, and 83% satisfied with weather information services received.
- 1,616 community members were involved in the identification of land for trapezoidal bunds, earth pan construction, pasture production, and dry land farming as well as selection of community representatives for DRR training.
- 73 hectares (180 acres) of land are under various innovations. Including:
 - Communal pasture reseeding undertaken on 25 hectares of land.
 - Tree nurseries established producing 27,700 seedlings on 10 hectares.
 - 3,050 indigenous tree seedlings were planted in three green belts (25 hectare).

Participatory platform for flood risk management in central Vietnam

Consortium lead: Institute for Social and Environmental Transition (ISET)

Partners: Adaptive Resource Management Ltd, CARE International, Da Nang CCCO, Da Nang University of Technology, Ministry of Natural Resources and Environment of Vietnam, National Center for Atmospheric Research (NCAR), National Center for Water Resources Planning and Investigation (NAWAPI)

Country: Vietnam

Project type: Seed

Thematic area: DRR, Modeling, Policy and Influence



The Institute for Social and Environmental Transition International (ISET) has created a participatory platform for flood risk management across two provinces, Da Nang and Quang Nam, in central Vietnam. This platform has allowed the provinces to assess the potential flood impacts of current and planned development, as well as upstream reservoir management, and will provide a mechanism for exploring the trade-offs of different development scenarios and pathways. Incorporating the Quang Nam floodplain includes the entire river basin flood plain and its infrastructure into one modeling tool, allowing for integrated planning and decision-making.

ISET provided the necessary equipment to improve the local early flood warning systems in two communes, Dai Hong and Hoa Khuong. This included life vests, sirens, generators, flashlights and megaphones, supporting the entire population of both communes – or over 23,000 people.

This project started at a moment of heightened policy interest at the national level in the operation of river basin organizations (RBO). For this reason, the entire process and structure set-up for the Vu Gia-Thu Bon river basin under this project has been watched closely by national stakeholders, with the intention of extracting lessons from it for the national policy inputs. To support its scaling-up strategy, ISET is anticipating additional funding for Quang Nam and Da Nang from GEF/UNDP to support the operation of the RBO in the next 5-year period (2019–2024).

Key achievements:

- 23,628 people use early warning systems or climate information as a result of pilots.
- 284 community members have participated in CARE's vulnerability assessments and resilience action planning activities.
- Quang Nam and Da Nang will receive a new project from GEF/UNDP to support the operation of the RBO in the next 5-year period (2019–2024). Active engagement of Da Nang and Quang Nam DONRE⁶³ with this project design period led by GEF helped to make sure lessons from the ISET project are taken into account.
- Improved visibility and awareness of hydropower on communities.
- Da Nang and Quang Nam's joint conclusion policy document was facilitated and accelerated by the project.
- 36 knowledge products have been generated – Blog posts: 15, Briefing note: 1, TV reports: 2, Newspaper articles: 17, Case study: 1.

⁶³ Department of Natural Resources and Environment

Nepal–India Transboundary Resilience (TBR)

Consortium lead: Lutheran World Relief

Partners: Asian Disaster Preparedness Center (ADPC), DanChurchAid (DCA), Grameen Development Services (GDS), Integrated Development Foundation (IDF), Koshi Victim Society (KVS), SAHAMATI, Yale University Himalaya Initiative.



Country: India, Nepal

Project type: Scale

Thematic area: Livelihoods, Innovative Finance, EWS, Policy and Influence

Lutheran World Relief (LWR) has worked with communities across the Nepal–India border to boost their ability to absorb, adapt, and transform in the face of annual floods. Building on a successful 2016 pilot, the project focused on integrated strategies to improve early warning systems (EWS), disaster risk reduction (DRR) and building resilient livelihoods through cross-border community-based structures, improved agricultural practices, and access to savings, credit and insurance schemes. The project has also bolstered the capacity to document and influence policy at the national and regional level through working with the Asian Disaster Preparedness Center (ADPC).

The TBR project brings together three distinct components: first expanding the pilot EWS program to reach additional communities in the Gandak/Narayani and Koshi river basins; second by testing livelihoods and social insurance components; and finally, by building the evidence base and community infrastructure for advocacy at the national and regional levels to scale transboundary water resilience initiatives in flood-prone regions in border areas. A major challenge was the heavy flooding experienced in August 2017, causing severe devastation and affecting the lives and livelihoods of the target communities.

This project combined community-level approaches increasing information and training to increase climate awareness and flood-resilient techniques with support to local governments on both sides of the border (India and Nepal). LWR has supported 96,790 people through the formation and strengthening of CDMCs and cooperatives; provision of emergency flood equipment; flood drill exercises; strengthening of an EWS; agricultural and business development support; and various other smaller-scale interventions. The project includes a focus on women and youth to enhance training and preparation for disaster; it has had positive support from government stakeholders and others partners keen to replicate the approach.

Key achievements:

- Over 84,000 people received real-time flood early warning information, with over 90% of beneficiaries receiving early warning information in time to act on it.
- 107 CDMCs working to respond to annual flooding.
- Over 3,700 households have purchased agricultural insurance policies and more than 3,000 households adopted and applied flood-resilient tools and practices.
- An MoU with the Department of Hydrology and Meteorology in Nepal was signed to strengthen and replicate the TBR model in other river basins.
- Over 85 savings and credit cooperatives providing financial services.
- Two Transboundary citizen forums have been established to empower communities to take on policy advocacy with local level government.

Transboundary flood risk mitigation through governance innovative information technology (TRANSFORM)

Consortium lead: Mercy Corps

Partners: Atma Connect (Atma), EcoMetrix Solutions Group (ESG), the Semarang City Development Planning Agency (Bappeda), YMCI

Country: Indonesia

Project type: Scale

Thematic area: DRR, Policy and Influence, Modeling



Mercy Corps has provided an information-based model for transboundary collaboration and investment to create flood resilience. The project took an integrated approach to flood risk reduction, introducing innovative and user-friendly information tools for communities, government, and private sector organizations. Working with these stakeholders in vulnerable downstream urban neighborhoods and upstream rural villages, the project provided actionable, real-time information on flood risks and projected returns on investment from flood risk reduction measures, strengthening structures for collaboration, and coordinated action.

The team successfully implemented 16 pilot and three large-scale flood mitigation and stormwater management interventions, enhancing flood resilience in both up- and downstream communities. The project has been carried out in a participatory way, with a focus on women's involvement. Through legalization of a Transboundary forum, additional decision-making and influencing power has been given to local stakeholders. Strong stakeholder buy-in has also triggered investment in future projects and had a positive influence on decision-making among local government and the private sector.

Support existed of pilot interventions (including tree planting, organic fertilizer production and school activities); trainings (including social media training and training on the Ecosystems Services Identification and Inventory (ESII) tool); transboundary multi-stakeholder workshops; and community group activities. Mercy Corps used the Z Zurich Flood Resilience Measurement Tool, comparing baseline and endline survey data scores against five capitals and four resilience characteristics. This indicated that 26,500 flood-prone individuals improved their resilience. Applying the tool enabled communities to develop action plans and measure resilience; indicators improved 70% on average.

Key achievements:

- Over 260,000 beneficiaries supported, 51% women, 49% men.
- Flood-prone individuals have improved their resilience mainly as a result of reduced run-off, strengthened transboundary coordination and through community networks.
- Legalization of the Transboundary forum – members advise the government, influence stakeholders, and unlock potential funding.
- 10,756 people use AtmaGo, a mobile-based app to read public safety reports and other neighborhood news, ESII tool was used for cost–benefit analysis.
- Stormwater management pilots resulted in 9,950 trees planted, 660 swales, 27 dry wells, 200 biopores built, is estimated to enable retaining 3.2 million liters in a 25-year storm event.
- Pilot projects for storm water management were replicated and triggered investment by local authorities and the private sector.

Roads to the Rescue

Consortium lead: MetaMeta

Partners: Institute of Water and Flood Management, Bangladesh University of Engineering and Technology (BUET)

Country: Bangladesh

Project type: Seed

Thematic area: Infrastructure, Technology, Policy and Influence



MetaMeta has supported the systematic use of roads for flood resilience and began upscaling this opportunity for wider use in the coastal regions of Bangladesh. The project has aimed to find ways to optimize the role of roads for flood resilience and water management, both technically and through improved governance. By bringing together government authorities, water and climate experts, and roadside communities – including women and the poor – the team has ensured that road construction efforts produce multiple benefits for all, and develop productive livelihoods, in spite of recurring flooding and high-water conditions.

The project has facilitated several workshops for main local stakeholders to discuss and find solutions jointly. A Consultative Group meeting was fundamental to foster common understanding and consensus on best practices. The endorsement of a joint Polder Development Plan is also crucial to act as a model for other polders. The initial investment by the grantee to support improved water drainage structures was redirected to support polder planning. An alternative option for supporting implementation was identified under the Blue Gold Program, where a budget of US\$500,000 has been set aside, including for roads for water interventions.

MetaMeta's Roads to the Rescue project installed new culverts (structures that direct water under roads) to relieve drainage issues. Insufficient water crossings in the polder causes frequent waterlogging and leads to crop failures, to which this intervention provided a solution. With six of the eight drainage bottlenecks addressed during project implementation, it is estimated that MetaMeta has supported 11,380 people (75%) of the polder population.

Key achievements:

- Validation of all assessments and inventories completed for the project polders.
- A meeting between Bangladesh University of Engineering and Technology and Blue Gold staff was held to validate the technical feasibility of the modeling scenarios and to discuss the design proposal.
- Participatory modeling was undertaken and results were presented and discussed in a local workshop with farmer leaders and stakeholders.
- Co-creation of communication products and guidelines (Recommended Good Practices).

One Resilient Team: Tacloban

Consortium lead: One Architecture



Local partners: Philippines

Reclamation Authority (PRA); Asian Institute of Management, Wetlands International

Country: Philippines

Project type: Seed

Thematic area: Infrastructure, DRR, Policy and Influence

The partners collaborated as "One Resilient Team" to combat flood risk in the Philippines. The project takes place in Tacloban City, an area that was devastated by Typhoon Haiyan in 2013. It is a multi-stakeholder initiative involving the community, local and national government, private sector, academics, and NGOs. The project implemented mangrove and beach forest restoration projects to fill in gaps in Tacloban's green infrastructure and improve coastal protection against storm surges and flooding, while incentivizing communities to protect and maintain reforested mangrove areas.

The pilot sites were monitored for ecological success, but also to assess economic, social and governance factors in individual project design, implementation, and maintenance. The main aim was to learn from the implementation of various pilots, documenting challenges and opportunities, to enable scaling and wider implementation. An estimated 5,847 people were supported, comprising recipients of trainings and capacity-building workshops associated with the restoration pilot sites, as well as those living directly on the floodplains of pilot sites and benefiting from increased flood protection. This kicked-off the much-needed implementation of the Tacloban "Building with Nature" masterplan and served as a pilot project for similar restorations and soft-infrastructure implementations elsewhere in the Philippine archipelago.

Key achievements:

- 5,847 individuals supported by the project through the two pilot sites completed to date:
 - One Resilient Team planted a total of 11.5 hectares of beach and mangrove forest.
 - 10,000 mangrove seedlings planted in Nula-Tula, with a survival rate of 97%.
 - In New Kawayan site, 5,000 beach forest (local species) seedlings were planted with a survival rate of 80% as a result of pests and diseases.
- The project engaged with eight policies to identify related policy and regulatory gaps that slow the implementation of coastal protection and proposed streamlined processes.
- Work has centered on disentangling the jurisdictional conflicts, overlaps and ambiguities that impede rehabilitation and resilience.
- 15 knowledge products generated in the course of the project period.
- The One Resilient Team endeavored to adapt to on-the-ground realities and closely involve local actors (governmental and community).
- High-level commitment from the Philippines Reclamation Authority, including CEO and Board, on the agency's evolution toward resilience.

Agricultural and water resilience in coastal areas of Bangladesh

Consortium lead: Practical Action

Partners: Regional Integrated Multi-Hazard Early Warning System (RIMES), Shushilan

Country: Bangladesh

Project type: Scale

Thematic area: Livelihoods, Gender, Policy and Influence



Practical Action has used meteorological agricultural information services and the improved commercial production and marketability of flood-saline resilient crops to build resilience in vulnerable communities in Bangladesh. Focused on improving the physical, social and economic resilience of poor families in six flood-prone sub-districts of Jessore, Shatkhira and Khulna districts, the project has mitigated the negative impact of flooding and salinity on agricultural livelihoods. The project particularly enhanced economic opportunities for poor farmers, especially women.

Practical Action works through layering a series of interventions to increase resilience. For example, through the provision of training in more resilient agricultural practice, access to market and climate information and alternative income generation options. It is working through 18 local women's associations, giving women better access to information from key institutions as well as training and support to create more sustainable livelihoods. Beneficiaries are receiving both disaster- and farming-related information services, with 95% applying that information. There is also positive evidence that farmers are sharing their knowledge with non-beneficiaries. Farmers are seeing the benefit of the new technologies, with increases in productivity despite flooding, and improved access to nutrition.

Practical Action tackled crop resilience in flood-prone Bangladesh, reaching 30,272 people by providing technical advisory services, trainings, and marketing support. Beneficiaries were equipped with the materials and knowledge to adopt innovative and climate-smart technologies such as vertical gardening, sack gardening, aquageoponics and vermicomposting. A dedicated call center was also established to provide agricultural information to farmers.

An independent evaluation carried out for Practical Action includes the use of the Flood Resilience Measurement Tool. The results of this work indicate that project beneficiary households became more resilient in respect of improving livelihoods and developing livelihood skill in the event of flooding disaster.

Key achievements

- 30,272 people were supported through different inputs and market support.
- Increase in agricultural productivity despite adverse weather conditions, through use of flood resilience agricultural techniques, resulting in increased household food security.
- 18 women's associations formed, which produced positive benefits in terms of women's access to key institutions, markets and information on pricing, and links to weather information, which was subsequently disseminated throughout the community.
- Agro-meteorology efforts at grassroots level were linked to a national project funded by World Bank to improve country-wide dissemination of weather information.
- 5,455 beneficiaries received training on climate adaptive agriculture practices, e.g., sack gardening, dike cropping, vermicomposting, aqua geponics, short-cycle shrimp farming, crab nursery management, and agro-met advisory services.
- 18 knowledge products have been developed

Building the resilience of vulnerable coastal communities against floods in Sri Lanka

Consortium lead: Seacology

Partners: Sudeesa, World Food Program (WFP)

Country: Sri Lanka

Project type: Scale

Thematic area: DRR, Livelihoods, Innovative Finance



Seacology has worked to build resilience through the conservation of mangroves among vulnerable communities in northern and eastern Sri Lanka. The region, one of the country's poorest areas, continues to suffer from the effects of the long-lasting civil war that ended in 2009. Mangroves are critical to building resilience: combating the effects of global climate change by absorbing up to 50 times more carbon than other types of ecosystems, acting as a natural buffer against the force of storm surges, and acting as critical nursery grounds for fish, enhancing employment opportunities.

Through the work of Seacology's project in Sri Lanka, communities were supported to come together in community-led plans to conserve mangroves. The project specifically focuses on vulnerable women, particularly those in single-income households. They set up 347 new women-led community-based organizations (CBOs) to deliver training in livelihoods, provide access to microloans to support those new livelihoods, and provide awareness-raising and strategies to conserve mangroves. The project is resulting in more resilient livelihoods and the conservation of mangroves as well as community strengthening and empowerment of women.

Seacology and Sudeesa support the Sri Lankan government in its innovative and historic effort to make Sri Lanka the first nation to fully protect all of its mangroves. There is evidence that this community model of mangrove conservation is successful. The project has the potential to serve as a model for greater mangrove conservation worldwide and has already begun to inspire efforts in other countries.

Key achievements:

- The Sri Lanka Mangrove project was selected as a recipient of the UN Momentum for Change Award in the Planetary Health category.
- 5,543 community members have joined CBOs set up by Sudeesa and are currently involved in protecting 3,475 hectares of mangroves.
- 1,822 mangrove conservation awareness sessions carried out and significant influence made on national policy to conserve mangroves.
- 3,592 women and youth trained under the project and 3,032 people received microloans.
- The community and job training center in Mannar has been completed and used to host the World Wetlands Day conference (Feb 18).
- Sri Lanka appointed lead in mangrove conservation efforts under the Commonwealth Initiative, which solidifies government commitment.
- The project is having a very important policy influence, feeding into the Sri Lankan government's initiative to conserve all mangroves, and increasingly has a global presence.

Ecology and gender-based flood resilience building in Thua Thien Hue, central Vietnam (ResilNam)

Consortium lead: University of Potsdam

Partners: Center for Social Research and Development, Institute for Earth and Environmental Science, Vrije Universiteit, Amsterdam

Country: Vietnam

Project type: Seed (Coastal and Urban)

Thematic area: DRR, Climate Change Adaptation, Gender



The team has worked to improve the resilience of societal groups especially vulnerable to flooding in the Thua Thien Hue Province of Vietnam through its coastal and urban seed projects.

Coastal: The project team of ResilNam–Coastal aimed to enhance flood resilience in coastal communities by strengthening the role of women in disaster risk management and climate change adaptation through ecosystem-based adaptation (EbA), such as the restoration, conservation, and sustainable management of mangroves in Southeast Asia’s largest lagoon. These activities have helped coastal communities improve resistance against chronic stress and shocks posed by flooding; improved their ability to bounce back in case the capacity to resist is exceeded; and have generated learning, awareness-raising and knowledge to achieve a system shift toward more inclusive approaches of DRM and climate change adaptation.

Urban: To enhance the flood resilience of urban communities, the project team of ResilNam–Urban has worked with the restoration, conservation, and sustainable management of natural retention and drainage areas in Hue City, central Vietnam. These bottom-up, nature-based solutions provided a means to strengthen the role of women in disaster risk reduction and climate change adaptation. Together with local and regional authorities and stakeholders from civil society, ResilNam–Urban aimed to overcome existing gender differences that make women especially vulnerable to the negative impacts of floods.

Key achievements:

- 4,800 coastal residents directly benefited from planting five hectare of mangroves in Hai Duong and Loc Vinh communes. 1,481 urban residents directly benefit from pond restoration.
- Strengthening the role of women in ecosystem-based adaptation. The provincial Disaster Management Center included EbA in their decision-making and used it to inform four local disaster and risk management plans.
- Following capacity-building activities by the DMC, the Women’s Union organized lively communication events on flood resilience and EbA for almost 700 women, including theater performances, an EbA quiz and karaoke of flood-related songs.
- To overcome the barrier toward more inclusive approaches, a comprehensive analysis of tangible costs and benefits over a 30-year period was conducted, revealing a positive benefit–cost ratio of 2.3 (i.e. each \$1 invested returns \$2.3 in benefits).
- The Disaster Management Center, women’s union, and local residents restored three water bodies in the historical center of Hue. Restoration involved reopening and linking drainage systems, solid waste collection and disposal and increased water holding capacity of Hoi Lake.
- Survey conducted across the two projects which reached 1010 coastal and urban households.

Development of amphibious homes for marginalized and vulnerable populations in Vietnam

Consortium lead: University of Waterloo

Partners: Can Tho University, Viet Nam Institute for Urban-Rural Planning Ministry of Construction, Vietnam National University, National Institute for Science

and Technology Policy and Strategic Studies (NISTPASS), Southern Institute of Water Resources Research (SIWRR), World Wide Fund for Nature (WWF)



UNIVERSITY OF
WATERLOO

Country: Vietnam

Project type: Seed

Thematic area: Infrastructure, Policy and Influence

The University of Waterloo, Canada, has adapted a model for low-cost amphibious houses, based on those used for decades in flood-prone areas of Louisiana, USA, for the Mekong Delta in Vietnam, considering the local environmental, economic, and social context. The proposed amphibious houses rise with the water and enable people to live with floods. It provides a solution for areas such as the Mekong delta with flooding during part of the year. Vietnam's Mekong Delta is home to 17 million people, 22% of the national population, most of whom are agricultural and aqua-cultural farmers. The area is prone to flooding, witnessing extreme displacement in 2000 and 2011. Data from the project will be used to develop a sustainable business model for replicating the housing design, and support an overall climate change adaptation strategy throughout the region and beyond.

Key achievements:

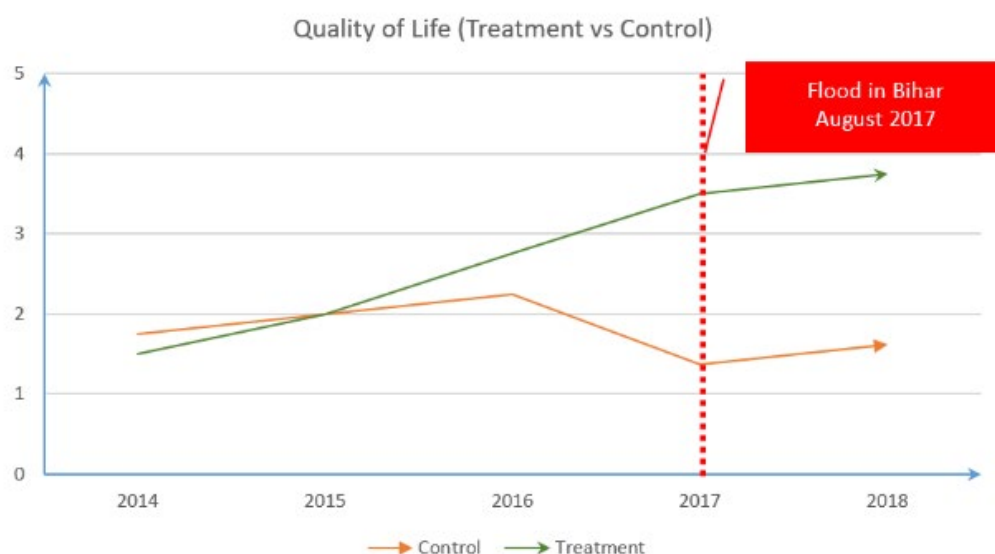
- Can Tho University expressed interest to host the 4th International Conference on Amphibious Architecture, Design and Engineering 2021.
- Two amphibious retrofits successfully completed in Vinh Phuoc Commune, An Giang Province in May 2018.
- Two amphibious retrofits in Vinh Chau A Commune, Long An Province completed by the end of July.
- The four amphibious houses were successfully tested in October, during the peak flooding season.
- There is interest from local government and private actors to replicate and subsidize the approach.

Annex 2: CBA case studies

The two boxes below summarize the LWR and University of Potsdam CBA results.

Lutheran World Relief Water Window Transboundary Resilience project

The team used a Method of Assessments for Projects and Program (MAPP), which involved conducting workshops in communities involved in the TBR project as well as in a few communities without any similar intervention (the counterfactual). The divergence in reported quality of life between the two groups is shown in the figure, and an example of how MAPP was used to capture attribution and relevance of the various project activities is shown in the table.



	Relevance	Main contributor	Main beneficiaries	Beneficiaries' as % of community	Own labor contribution (work burden)	Own financial contribution (financial burden)
CDMC and Training	4	M+F	M+F	CDMC MEMBERS	1	0
EW Equipment	4	M+F	M+F	WHOLE COMMUNITY	0	0
Education - Simulation and Drill	4	M+F	M+F	WHOLE COMMUNITY	1	0
Flood resilient Agriculture – inputs and services	4	M+F	M+F	SELECTED FARMERS	2	2
SHG/ Cooperative	5	F	F	FEMALE	1	2
Emergency fund and Insurance	4	M+F	M+F	CDMC MEMBERS	1	0
Transboundary Citizen forum	4	M+F	M+F	TBCF MEMBERS	1	0
Legend						
	Contributor / Beneficiaries		Relevance		Burden	
	M Male		5 Very relevant		5 Very high burden	
	F Female		4 High relevance		4 High burden	
			3 Average relevance		3 Average burden	
			2 Low relevance		2 Low burden	
			1 Very low relevance		1 Very low burden	
			0 No relevance		0 No burden	

The CBA considers three *possible* benefit streams:

1. Reduction in damages to properties and assets during flooding owing to the EWS.
2. Reduction in the financial value of damages to properties and assets during flooding owing to the insurance intervention.
3. Increase in agriculture income owing to the introduction of resilient varieties.

In practice, they were not able to calculate protective benefits from benefit streams 1 or 2.

Hence, they focus on the direct economic benefit owing to 3 (the use of hybrid rice varieties especially during the planting season that was affected by the 2017 flooding). LWR did **not** attempt to estimate future impacts.

Costs were estimated by activity stream as shown below:

Activity stream included in CBA	Total output budget (\$)	Other programmatic expenses and overhead	Total cost for the activity stream
Establishing CDMCs	\$39,668.10	\$117,050.78	\$156,718.88
Establishing EWS	\$1,708.85	\$117,050.78	\$118,759.63
Introducing flood resilient crops and livelihood options	\$44,351.04	\$117,050.78	\$161,401.82
Strengthening SHGs and Cooperatives	\$17,980.41	\$117,050.78	\$135,031.19
Providing safety nets through insurance	\$20,947.81	\$117,050.78	\$137,998.59
Producing EWS Policy documents	\$3,520.00	\$117,050.78	\$120,570.78
Establishing Transboundary Citizen Forum	\$42,170.99	\$117,050.78	\$159,221.77

The B:C calculation is as follows:

Benefit-cost ratio – Resilient Varieties (Materialized benefits in 2018)		
A	Total upfront cost for introducing flood resilient crops and livelihood options	\$161,401.82
	Total Capital Cost (less provision of resilient varieties)	\$44,351.04
	Share of overhead and other programmatic expenses	\$117,050.78
B	Number of (hh) reached	3119
	Average cost per HH reached	\$51.75
	Average additional cost of using resilient varieties	\$200.00
C	Total average cost for those provided with resilient varieties	\$251.75
D	Average agri income for farmers who did not use resilient varieties (without)	\$ 52.08
E	Average agri income for farmers who used resilient varieties (with)	\$ 632.98
F	Difference (E-D)	\$ 580.90
G	Benefit/Cost Ratio	2.31
H	Net benefit of investment using improved crops (43% use rate based on survey)	\$ 618,603.22

The major protective benefits that could not be calculated owing to lack of data were the reduction in lives lost, injuries sustained, and livestock lost. The CBA does include program costs.

The B:C ratio is highly conservative as LWR considers only a limited range of benefits and restricts these to the life of the project, yet includes full program costs.

University of Potsdam ResilNam

Pre-test surveys were used to identify the range of benefits that local residents consider most important to them. They focus on these values in the CBA – separate exercises for coastal and urban interventions. **Only local financial benefits are included (i.e. carbon sequestration values and program costs are excluded).** The justification for this was to show local policy-makers the returns using *local* costs and benefits.

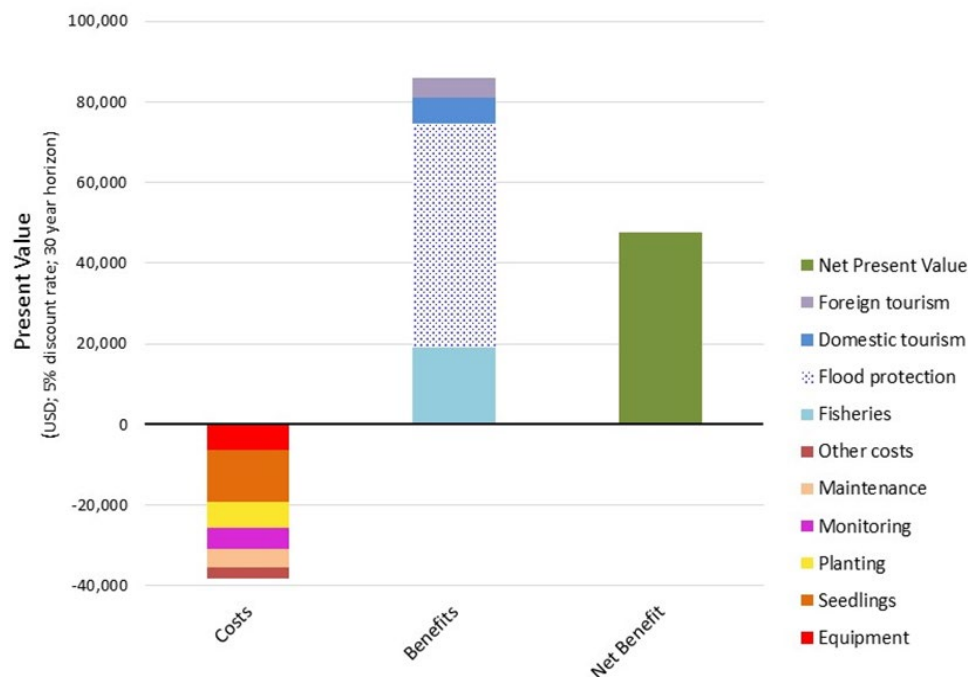
Some benefits are linked to beneficiary surveys. Urban recreation and aesthetic values for ponds were estimated from a choice experiment and a tourism survey estimated willingness to pay for a half-day mangrove tour. However, flood impact reduction benefits are projected using research on flood reduction from the increased area of mangroves. Benefits and costs are projected up to 30 years ahead with a 5% social discount rate.

For the rural case, the costs of mangrove planting over 30 years are \$38,000 with the main components being the cost of buying seedlings, planting and equipment. The total benefits are \$86,000, which comprises reduced flood damage, enhanced fish harvest and eco-tourism. The net present value (NPV) is \$48,000 and the benefit–cost ratio is 2.3.

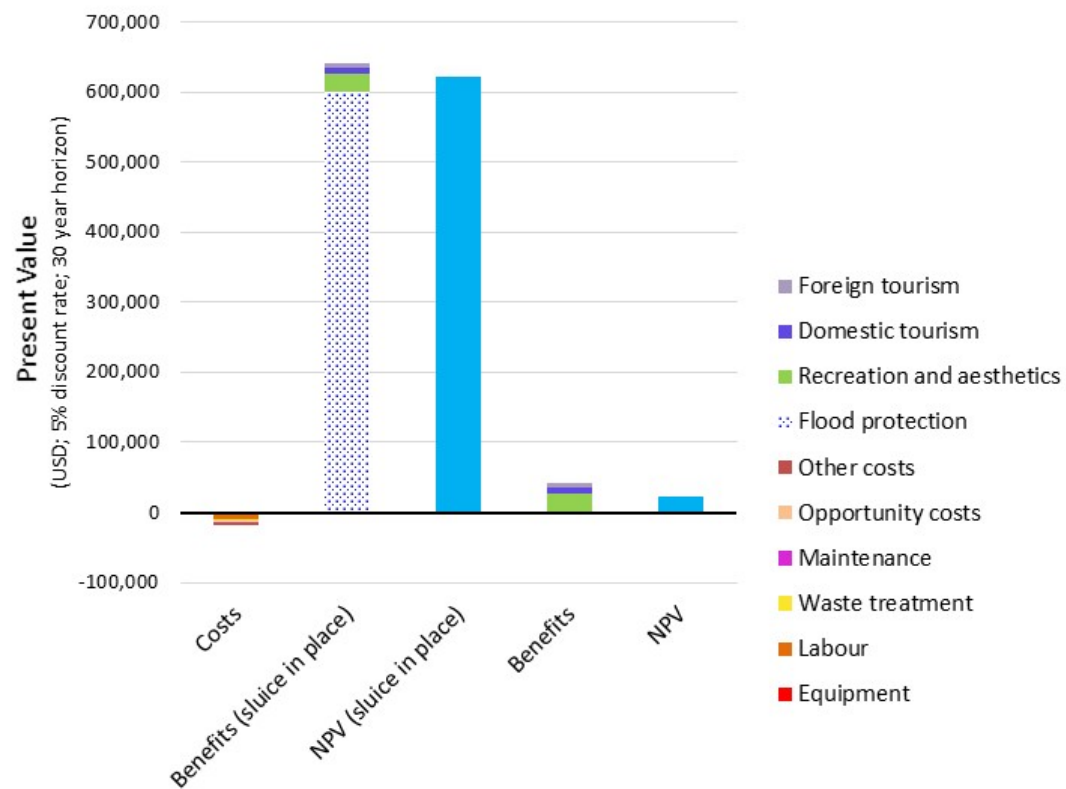
The results of the CBA of restoring urban ponds are represented in the figure below. The total costs over 30 years are \$19,000 with the main components being the labor cost of cleaning the ponds and the cost of waste disposal. The total benefits are \$641,000, which is dominated by reduced flood damages, assessed using a flood damage model assuming sluice gates are installed between the river and the citadel (displayed as “sluices in place” in the second figure). The return on investment is very high with an NPV of \$622,000, a benefit–cost ratio of 34.

Without the sluice in place, the benefits from urban flood prevention project activities still exceed costs (B:C of 2.2) but are much higher (B:C of 34) if an externally funded sluice is built. As this is a much larger investment, the costs are not included in this CBA – although ideally a joint sluice and project CBA would be undertaken.

Costs and benefits of mangrove EbA investment



Costs and benefits of urban pond EbA investment





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