

# Pre-Feasibility Study

Provision of Project Preparation Services through the GCF Project Preparation Facility (PPF) for the Partnership for Governance Reform (Kemitraan) for the Project *“Building Flood Resilient Community through Adaptive Livelihood and Runoff Management in Petanglong Area of Central Java Province of Indonesia (BRAVE)”*

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## List of abbreviations

CIS	Climate Information System
CRDP	Climate Resilience Development Policy
EE	Executing Entity
GAP	Good Agricultural Practice
GCF	Green Climate Fund
GHP	Good Handling Practice
LTS-LCCR	Long-Term Strategy for Low Carbon and Climate Resilience
MCI	Mercy Corps Indonesia
NBS	Nature-based solutions
NDC	Nationally Determined Contribution
O&M	Operations and Maintenance
Petanglong	Pekalongan City, Pekalongan Regency and Batang Regency
PKH	Program Keluarga Harapan
PMU	Project Management Unit
PWD	People with disabilities
RAD-API	Regional Action Plan for Climate Change Adaptation Rencana Pembangunan Jangka Panjang Daerah (Long-Term Regional Development Plan)
RPJPD	Plan)
USP-2	Updated Strategic Plan
ZFRA	Zurich Flood Resilience Alliance

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# 1 Context setting

## 2.1 Introduction

This pre-feasibility study provides background information to the Green Climate Fund (GCF) funding proposal for the project: *Building Flood Resilient Community through Adaptive Livelihood and Runoff Management in Petanglong Area of Central Java Province of Indonesia (BRAVE)*, prepared for Kemitraan by Oxford Policy Management (OPM). The purpose is to provide an assessment of the proposed project design and additional detail on the justification and rationale to support the funding proposal.

## 2.2 Overview of the Project

The BRAVE project is structured around three interconnected outcomes, each designed to build upon the last to ensure a durable and self-sustaining model of resilience.

- Outcome 1, **Climate Information-Based Planning and Design**, establishes a scientific foundation for all interventions by conducting comprehensive landscape resilience assessments and developing a unified climate information and early warning system. This data-driven approach is critical for informing the subsequent, on-the-ground activities.
- Outcome 2, **Resilient Community and Ecosystem**, represents the core implementation phase. It translates the plans from Outcome 1 into tangible actions, including the widespread adoption of climate-smart agriculture and adaptive aquaculture, as well as the establishment of nature-based runoff management systems such as blue-green spaces.
- Outcome 3, **Enabling Environment for Replication and Scale-Up**, focuses on long-term sustainability. It aims to institutionalize a climate-resilient Integrated Water Resource Management (IWRM) framework into government policy and to develop and promote financially viable, market-proven business models for local livelihoods.

The project is designed to yield substantial and quantifiable impacts. It is projected to directly benefit 49,647 households (approximately 198,500 people), of whom include 6,420 households for agriculture/aquaculture livelihoods and conservation activities, and 43,227 households benefitting from blue green space and flood early warning system and contingency plans. This project aims to indirectly benefit 340,000 households (approximately 1.36 million people) across the region. Key economic outcomes include an expected increase in household income by up to 20% in average and the sustainable management of over 3,700 hectares of productive land. The project's design and strategic focus align directly with the GCF's updated Strategic Plan (USP-2) targets, particularly in the areas of Climate Information and Early Warning Systems (CIEWS), food security, ecosystem resilience, infrastructure, and innovation and market creation.

## 2.3 Methodology for the Pre-Feasibility Study

**Blue green study methodology:** The PFS made a high-level assessment of any viable alternatives regarding the location and overall design of the Blue Green Space for the proposed project in the Kupang and Sengkarang watersheds. Our experts identified technical (design-related, infrastructural, environmental/scientific) and non-technical barriers

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(institutional/regulatory, socio-economic) that could hinder the space from delivering the intended functions, recognizing potential beneficiaries of the space, and assessing the most efficient and effective measures to address the barriers. Based on emerging results from the AF and ZFRA projects, the PFS provided key recommendations on potential site location and the overall design of the Blue Green Space. This built on the existing and published work of MCI (e.g., climate risk projection and flood modeling of Kupang Watershed conducted under the Zurich Flood Resilience Alliance (ZFRA) Project).

The technical assessment of the blue green space looks at the following aspects:

- A) Stakeholder understanding on hydrological issues (especially flooding) and blue-green space concept
- B) Blue-green space design based on site suitability (topography, land cover, and local stakeholder acceptance).
- C) Challenges and barriers of the blue-green space establishment
- D) Other socio-economic benefits based on blue-green space design recommendations.

This study uses spatial analysis, field observation, FGD, and interview approaches. Spatial analysis is used to determine the scope and characteristics of the study area at the watershed and sub-watershed levels. Field observation is used to determine and verify actual field conditions that cannot be obtained from spatial data due to the scale being too broad. FGD and interviews are used to determine stakeholders' perceptions regarding the problems of the Kupang and Sengkarang watersheds and the concept of blue-green space. These FGDs and interviews involve several government institutions at the national level (BBWS Pemali-Juawana and BPDAS Pemali-Jratun), the provincial level (Pusdataru), responsible for managing the Kupang and Sengkarang watersheds, the district level (Bappeda, DLH, PU, BPBD), and representatives from the sub-districts.

**Agro-fishery methodology:** A thorough market value chain analysis was conducted for 5 commodities. Our experts first identified five commodities- Carrot, Coffee, Corn, and specific Milkfish (including its processed product) and Grouper products, by reviewing past project data and consulting with stakeholders. They conducted five focus group discussions and a desk review to analyze the value chain for these items. These activities included mapping market participants, analyzing the enabling environment (policies, technical, and financial factors), and assessing the need for financial services and technical support. The findings were then validated through a workshop with MCI and Kemitraan.

The analysis was guided by the Market System Development method. This approach involved:

- Identifying key actors from producers to consumers.
- Examining the constraints they faced.
- Analyzing supporting actors
- Investigating enabling factors like laws and regulations.

Tools such as Value Chain Stream Mapping, Profit Margin Analysis, SWOT Analysis, and Benchmarking were also used to evaluate the production, distribution, and consumption processes.

**A full list of stakeholders consulted can be found in Annex 13 Stakeholder Engagement Plan of the Funding Proposal.**



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## 2.4 Baseline and situation analysis

In this section the baseline situation of the project is explored in detail, including the current climate risks and impacts, as well as policy response.

### 2.4.1 Overview of climate risks in Indonesia

**Indonesia is highly vulnerable to the impacts of climate change, with flooding as one of the most frequent and damaging hazards.** The country ranks among the top nations for climate risk exposure, particularly in its low-lying coastal zones.<sup>1</sup> Around 60% of Indonesia's population lives along its 100,000 km long coastline, and an estimated 3,000 coastal villages experienced flooding between 2016-2018<sup>2</sup>. Sea levels are steadily rising (about 4-5 mm per year along the Java coast) and many coastal areas are simultaneously sinking due to land subsidence. As a result, coastal flooding and tidal inundation are worsening. Without adaptation measures, over 4.2 million Indonesians could be exposed to permanent coastal flooding by 2070–2100, underscoring the urgent need for resilience-building in vulnerable regions<sup>3</sup>.

### 2.4.2 Climate change impacts in Pekalongan (Petanglong Area)

**The Petanglong area, encompassing Pekalongan City, Pekalongan Regency, and Batang Regency in Central Java, Indonesia, is home to over 2 million people** and is significantly affected by climate change. Persistent flooding caused by sea level rise, land subsidence, and insufficient water management has created a crisis-like situation in the region.

**Climate change has a critical impact in the Petanglong area of Central Java.** This north coast area has suffered repeated severe flooding since the early 2000s. Both flash floods from upstream and coastal/tidal floods from the Java Sea occur with increasing frequency; in fact, parts of Pekalongan experience inundation almost annually during high tides or heavy rains<sup>4</sup>. This is compounded by historical land subsidence rates of 10–17 cm annually in the city and regency, escalating the flood risk; decades of groundwater over-extraction have caused the land to sink 30–50 cm below sea level in coastal sub-districts<sup>5</sup>. Climate change has led to shifts in rainfall patterns (bringing more intense downpours) and a persistent sea-level rise of ~5 mm per year along this coast—notably surpassing the Java Sea's average of 3.9 mm annually.

**At the same time, unsustainable human activities across the landscape amplify the hazard.** In the upstream watershed, deforestation and poor land management (e.g. unsustainable agriculture) have reduced water retention and increased runoff, sending more floodwater downstream. In midstream areas around the city, rapid urbanization and expansion of paved surfaces have further accelerated runoff, overwhelming drainage capacity. Along the coast, excessive groundwater pumping for freshwater has caused rapid land subsidence dramatically lowering the land elevation.

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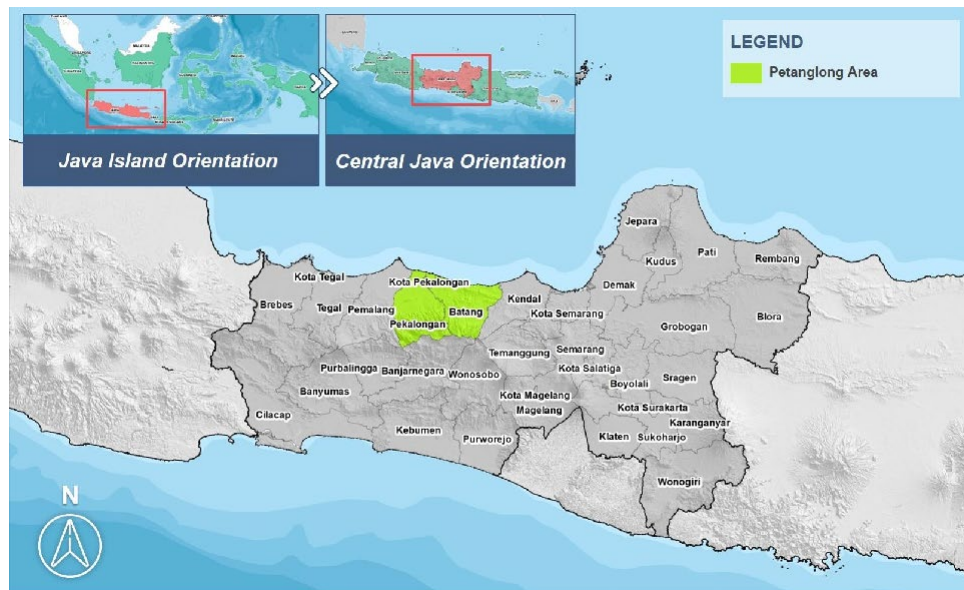
<sup>1</sup> Climate Risk and Impact Assessment of Pekalongan, Indonesia Technical working report, July 2021 Mercy Corps Indonesia

<sup>2</sup> Ibid

<sup>3</sup> Ibid

<sup>4</sup> Partnership Collaborating with Pekalongan City Government to Build Resilience Against The Impacts of Climate Change, Kemitran Partnership

<sup>5</sup> ibid



**Figure 1 Figure 1 Petanglong Area in Central Java Province, Indonesia**

**The combination of a rising sea and sinking land has made tidal flooding unavoidable in low-lying parts of Pekalongan.** Since 2011, roughly 700 hectares of land in coastal Pekalongan have been permanently lost to the sea—areas that were once rice fields or aquaculture ponds are now permanently inundated water basins<sup>6</sup>. Climate projections indicate these trends will worsen. Modelling for the Pekalongan/Kupang watershed shows that extreme rainfall events will become more frequent and intense through 2035, raising flood risks further. The impact on communities has been devastating—frequent floods have caused loss of assets and productive land, damage to roads, housing and public infrastructure, and continual disruption of livelihoods.

**The intensification of hydro-meteorological disasters, as projected in Indonesia's National Mid-Term Development Plan (RPJMN) 2020–2024, highlights the increasing urgency of climate adaptation.** Anticipated impacts include more intense rainfall during the wet season, reduced precipitation during the dry season, and extreme wave heights exceeding 1.5 meters. Predicted rainfall fluctuations of -2.5 to 2.5 mm per day underscore the growing challenges for water resource management and disaster preparedness. If no corrective action is taken, researchers project that by 2035 up to 90% of Pekalongan City's area—and a large share of the adjacent coastal regency—could be inundated either permanently or regularly by tidal floods. This equates to 5,200 - 5,700 hectares of land flooded, including many residential and economic zones<sup>7</sup>.

**Climate projections in the Climate Risk and Impact Assessment (CRIA) for the Kupang watershed, conducted by the Zurich Flood Resilience Alliance (ZFRA), indicate more frequent and intense extreme rainfall toward 2035 in upstream areas, raising flash-flood risks that propagate downstream into already subsiding, low-lying coastal zones.** Landscape-scale flood modelling conducted for the area shows potential

<sup>6</sup> Pekalongan Flood Risk and Impact Assessment predicts 90% of the City will be inundated by 2035: how is climate change impacting Indonesia? *Denia Aulia Syam and Yoko Okura, October 19, 2020, Climate Resilience Alliance*

<sup>7</sup> Ibid

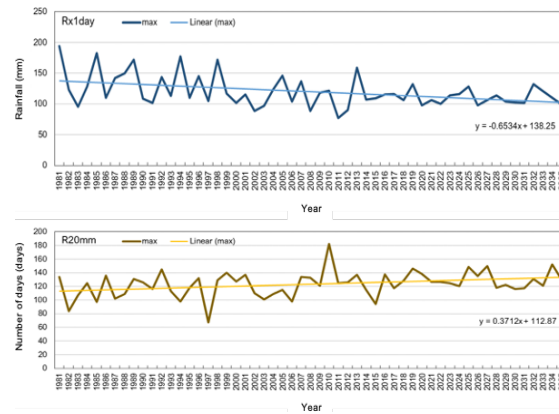
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expansion of inundation from ~1,800 ha (2020) to ~5,700 ha by 2035, with up to ~90% of Pekalongan City's area at risk of permanent or recurrent tidal flooding without corrective measures.

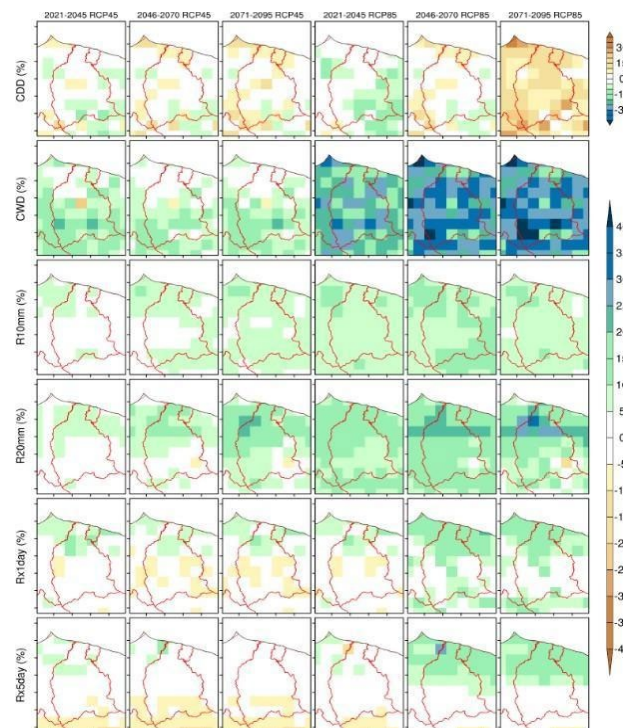
**The CRIA provides a comprehensive scientific basis for understanding local climate risks.** It combines climate projections (decadal and long-term), hazard and flood modelling, and vulnerability and impact assessments. Under the decadal prediction, three extreme rainfall indices were analyzed:

- Rx1day (maximum daily rainfall in a single year),
- Rx5day (highest five-day cumulative rainfall in a single year), and
- R20mm (annual number of days with >20 mm rainfall).

Results show that upstream areas are likely to see increasing frequency and intensity of extreme rainfall, while midstream and downstream zones may face more frequent but less intense rainfall. Monthly rainfall anomalies confirm a continued "Above Normal" trend, suggesting flash floods will increasingly affect downstream communities without corrective measures.



**Figure 2 Historical trend and decadal prediction of Rx1day Wet Extreme Index (above) and R20 mm (below)**



**Figure 3 ETCCDI index**

**The projections also indicate drier dry seasons, which could undermine water supply, agriculture, and agroforestry.** This calls for water infrastructure designed to handle greater variability and equipping farmers with climate information to adjust their practices. Long-term modeling under RCP 4.5 predicts wetter conditions across Pekalongan, especially in upstream and coastal zones, with higher intensity and frequency of extreme rainfall events (Rx1day, Rx5day, R10mm, R20mm). Under RCP 8.5, consecutive wet days may increase by up to 40% by 2035, while dry days show little change.

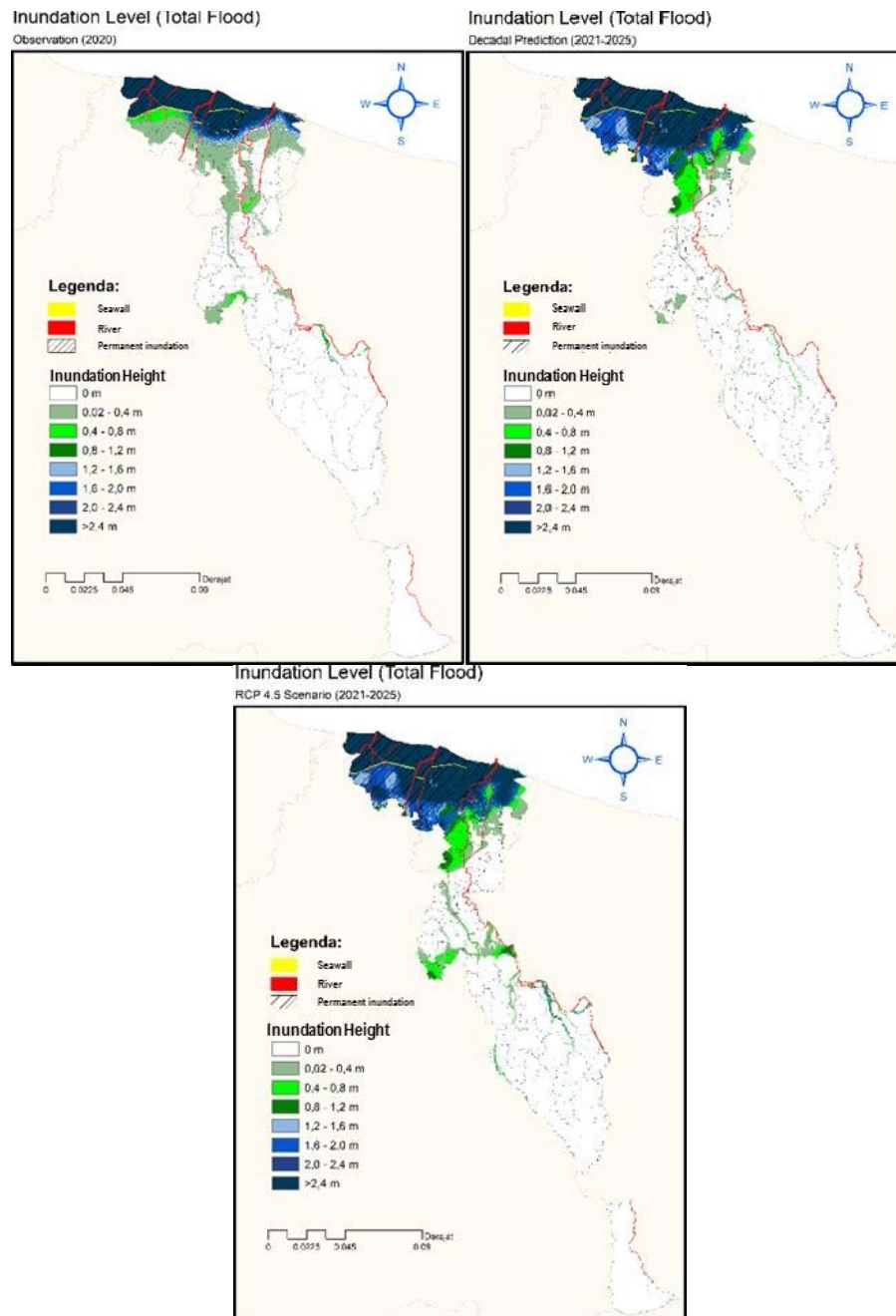
**Climate variability, combined with sea level rise (projected at 0.81 cm/year by 2035) and land subsidence (0–34.5 cm/year), will significantly intensify flood risks in the**

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**Petanglong area**<sup>8</sup>. Spatial inundation models indicate that the flooded area in the Kupang watershed and adjacent coastline will expand nearly threefold- from about 1,800 hectares in 2020 to 5,700 hectares by 2035 (Figure 3 Observation in 2020 (left) and Simulation of Inundation Model for the Period of 2021-2025 for Decadal Prediction (middle) and RCP 4.5 (right) in Kupang Watershed and Adjacent Coastline of Pekalongan below). The maximum inland reach of inundation, which extended 4.2 km from the shoreline in 2020, is projected to stretch to 8.5 km under the decadal scenario and up to 9.4 km under the RCP 4.5 projection. Consequently, the share of villages/kelurahans with a “very high” hazard index is expected to rise sharply, from 10% in 2020 to nearly 40% by 2035.

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<sup>8</sup> Mercy Corps Indonesia, 2020. *Climate Risk and Impact Assessment of Kupang Watershed and Coastal Area of Pekalongan City and Regency*



**Figure 4 Observation in 2020 (left) and Simulation of Inundation Model for the Period of 2021-2025 for Decadal Prediction (middle) and RCP 4.5 (right) in Kupang Watershed and Adjacent Coastline of Pekalongan**

### Shifts in Land Use and Economic Impacts

**Coastal inundation has drastically transformed land use in the region.** By 2010, approximately 200 hectares of residential areas, 210 hectares of farmland, and 275 hectares of aquaculture ponds in Pekalongan City were submerged. In North Pekalongan sub-district, 42% of land between 1999 and 2016 was converted into waterlogged zones or aquaculture ponds. Farmers in these areas face salinity issues and reduced productivity, forcing many to abandon agriculture and pursue alternative income sources.

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## Water Scarcity in Upstream Areas

**Upstream regions struggle with water availability due to climate variability.** As of 2020, the state-owned water utility served only 40% of Pekalongan City and 11% of Pekalongan Regency. Seasonal water shortages compel residents to rely on groundwater, further degrading environmental resources.

## Watershed Degradation

**Land use changes, deforestation, and unsustainable practices have degraded the Kupang and Sengkarang watersheds.** Currently, 21% of the watershed area is in critical condition. Between 2000 and 2021, satellite data recorded a 23% loss of forest cover due to logging and agricultural expansion, reducing water retention and amplifying flood risks. Addressing these issues requires implementing sustainable land management practices, improving runoff control, and adopting resilient livelihood strategies to restore ecosystem functionality.

## Environmental Degradation and Livelihood Vulnerability

**Flooding has eroded over 1,400 hectares of coastal land, displacing some residents while others endure unsanitary conditions.** Losses of mangroves, aquaculture ponds, and arable land further jeopardize economic stability. The Livelihood Vulnerability Index (LVI) for flood-affected villages highlights severe risks related to livelihood disruptions (0.497) and health concerns (0.485). Recurrent flooding imposes heavy financial and social costs on communities and local governments.

## Socio-Economic Vulnerability

**The escalating flood hazard in Pekalongan has dire socio-economic implications.** The economic burden of flooding is immense. By 2020, flood-related damages in high-risk villages amounted to \$110.7 million annually, exceeding 40% of the combined budgets of Pekalongan City and Regency. Projections suggest these losses could reach \$2.2 billion per year by 2035 if no action is taken. Current adaptation costs, including asset repairs, amount to \$16 million annually, while income losses and land productivity reductions add \$24 million in damages.

**Rapid land subsidence and sea encroachment have already displaced communities and undermined coastal livelihoods (e.g. fisheries, batik industry, farming).** In purely spatial terms, the portion of Pekalongan City's residential land exposed to flooding is expected to skyrocket from only about 0.5% in 2020 to an alarming 51% by 2035. Such inundation will directly affect hundreds of thousands of residents. The economic toll is equally worrying: one assessment estimated that Pekalongan faces a potential loss of up to IDR 7 trillion from tidal flooding in the coming years if no intervention is made.

**At the provincial scale, Central Java's government calculates that climate change impacts could cost the province IDR 14.9 trillion in the 2020–2024 period alone,** with the largest losses in agriculture (IDR 11.1 trillion), followed by significant losses in the coastal sector (IDR 0.9 T), water resources (IDR 0.3 T), and public health (IDR 2.6 T)<sup>9</sup>. These figures illustrate how severely floods and climate stressors threaten local economies and development gains. Moreover, recurring floods impose high costs on local governments-

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<sup>9</sup> Launched RAD API Document of Provincial Government and Municipal and District Governments of North Coastal Central Java, 2024 Kemitraan Partnership

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Pekalongan's budget has been strained by the need to continually fund emergency response, drainage pumping, and repairs to damaged infrastructure.

**Social vulnerability further exacerbates the situation.** Adaptive capacity is constrained by uneven service access, limited resources to elevate homes or relocate, and gaps in risk-informed land-use and water governance. Local studies document livelihood vulnerability (e.g., aquaculture and agriculture losses), health risks (water-borne disease in inundated neighborhoods), and gendered impacts, with women (including female-headed households) and children disproportionately affected during prolonged tidal floods.

**Many affected communities have limited capacity to adapt due to poverty and lack of resources.** Poor socio-economic conditions and low awareness of adaptation options hinder households from adopting resilient practices, meaning people are often ill-prepared for disasters. For instance, not all residents can afford to elevate their homes or relocate from hazard zones, and knowledge of flood risk reduction measures is uneven. In summary, Pekalongan is prone to high exposure to climate hazards, critical ecological stresses (land subsidence), and significant social vulnerability, all of which combine to make flood risk a pressing development issue.

### 2.4.3 Current approach to Flood Resilience

**Both government authorities and local communities have made efforts to manage the flooding, but thus far these efforts have been fragmented and insufficient given the scale of the problem.** The Pekalongan City government, for example, has put in place an annual flood evacuation plan to aid in emergency response<sup>10</sup>. They have also tried short-term coping measures-providing affected fisherfolk and farmers with replacement inputs (like fish seedlings and nets after fishponds are flooded) and reinforcing or raising embankments in some coastal villages. Individual households and community groups have taken their own adaptive steps where possible: residents have elevated the floors of their homes, shifted livelihoods (e.g. finding non-farm work if fields have turned to sea), and carried out volunteer activities like periodic canal cleaning.

**These measures have largely been piecemeal and reactive, not guided by any comprehensive long-term strategy.** For instance, raising a house floor may provide temporary relief but does not stop the encroaching floods around the neighbourhood. Likewise, building ad-hoc earthen embankments can give brief protection until the next extreme tide overtops them. The root causes-such as subsidence from groundwater use, inadequate drainage planning, and ecosystem degradation-have not yet been fully addressed in the current approach.

**Historically, flood management in this region (as in much of Indonesia) has relied heavily on structural defences-pumps, sea walls, dikes, and other grey infrastructure designed to hold back water.** While such defenses are important for immediate risk reduction, they often overlook the role of human behavior and ecosystem services in shaping flood risk. For example, mangrove forests, if restored, could naturally buffer coastal storm surges; upland conservation could reduce runoff; and community preparedness can greatly reduce disaster impacts. The structural-only approach, by "fighting water" without adapting how land and water are managed, has yielded diminishing returns as the

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<sup>10</sup> Partnership Collaborating with Pekalongan City Government to Build Resilience Against The Impacts of Climate Change 2021, Kemitraan partnership



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environment changes. Recognizing this, stakeholders are now pushing for more holistic and sustainable resilience strategies.

#### 2.4.4 Integrated Flood Resilience Strategy

**There is a growing recognition from national and local stakeholders on the need to move towards a more integrated approach to building flood resilience.** In September 2024, the Central Java Provincial Government and five north-coast districts (including Pekalongan City/Regency) jointly launched a Regional Action Plan for Climate Change Adaptation (RAD-API) for the North Coast region<sup>11</sup>. This RAD-API provides a coordinated climate adaptation framework across administrative boundaries, acknowledging that the “sinking coastline” problem cannot be solved by one city alone. The plan was developed in line with national guidelines (Ministry of Environment Regulation No. P.33/2016 on adaptation planning) and is one of the first landscape-based climate adaptation governance efforts in Indonesia. RAD-API document of Pekalongan City, in particular, has set out landscape-based prioritised adaptation actions at micro and site level, such as climate-adaptive settlement reconstructions, communities-based clean water infrastructure provision, provision of coastal-protection vegetation/infrastructure, coastal ecosystem based adaptation, and adaptive drainage design.

**By involving the province and multiple municipalities , the RAD-API enables joint planning on issues like coastal zone management, land use zoning, and disaster response.** Notably, officials emphasized the need for a “watershed and seascape” approach, since floodwaters and tidal impacts do not respect administrative borders-as a provincial climate director remarked, water flowing from upstream “has no ID card” to show which district it belongs to. This sentiment underlines the importance of inter-district coordination and data sharing in tackling flood risks.

**In parallel, community-level and NGO-led programs have started building resilience on the ground.** One example is the Zurich Flood Resilience Alliance (supported by the Zurich Foundation , under which Mercy Corps Indonesia and Indonesian research partners conducted a detailed *Climate Risk and Impact Assessment* for Pekalongan in 2020. That assessment provided evidence of how poorly planned development (like excessive groundwater use or building in floodplains) was exacerbating flood losses and highlighted the need for nature-based solutions and resilient livelihood strategies<sup>12</sup>. The findings are being used to inform local government policies on zoning, flood infrastructure, water resource management, and capacity-building for disaster risk reduction.

**Another notable initiative is the Adaptation Fund-supported “Safekeeping-Surviving-Sustaining” (3S) program in Pekalongan City, launched in 2021 by the NGO Kemitraan.** This 3S program explicitly focuses on pro-poor climate adaptation actions and natural solutions. It began with mapping the root causes of the flooding problem and works to enhance the capacity of coastal communities for adaptation<sup>13</sup>. Interventions under 3S include restoring mangrove belts and other ecosystem-based measures to attenuate tidal waves, as well as social programs to strengthen community preparedness. These efforts,

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<sup>11</sup> Launched RAD API Document of Provincial Government and Municipal and District Governments of North Coastal Central Java, 2024, Kemitraan Partners

<sup>12</sup> Pekalongan Flood Risk and Impact Assessment predicts 90% of the City will be inundated by 2035: how is climate change impacting Indonesia? *Denia Aulia Syam, Yoko Okura, 2020, Climate Resilience Alliance*

<sup>13</sup> Partnership Collaborating with Pekalongan City Government to Build Resilience Against The Impacts of Climate Change, 2021, Kemitraan Partners

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though still in early stages, complement government actions by engaging local stakeholders (communities, universities, and the private sector) in resilience-building.

**The proposed BRAVE project (“Building Flood Resilient Community through Adaptive Livelihood and Runoff Management in Petanglong Area”) builds upon this momentum of integrated adaptation.** The project’s strategy is to adopt a *transboundary watershed approach* covering the Kupang and Sengkarang river basins that span Pekalongan City, Pekalongan Regency, and Batang Regency<sup>14</sup>. By looking at the whole landscape from upstream highlands to the coastal downstream, BRAVE aims to tackle the linked drivers of flood risk. This means working with upstream farming communities to promote climate-resilient agriculture and ecosystem-based measures (reducing erosion and runoff), managing midstream urban runoff through improved runoff management using green structure , and enhancing coastal community resilience by fostering adaptive and diversified aquaculture commodities.

**The project emphasizes balancing livelihood improvement with ecosystem preservation– recognizing that communities need viable incomes that don’t inadvertently increase climate risk.** For example, fostering alternative livelihoods less dependent on groundwater extraction or land-intensive practices can help curb subsidence and environmental degradation. The BRAVE initiative aligns with the national adaptation agenda and the local RAD-API, as it seeks to implement a visionary, long-term solution rather than ad-hoc fixes. In doing so, it directly addresses the critical gap identified in the baseline: the need for strategic actions that integrate human, economic, and ecological dimensions of flood resilience.

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<sup>14</sup> Concept note- Building Flood Resilient Community through Adaptive Livelihood and Runoff Management in Petanglong Area of Central Java Province of Indonesia (BRAVE)

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## 3 Policy, Regulatory and Legal Landscape

**The Indonesian government has recognized the challenges it faces in flood management and has begun integrating climate resilience into its policies and plans.**

The Climate Resilience Development Policy 2020–2045 (CRDP) is one of the strategic framework at the national level that reflects the Government of Indonesia’s commitment to integrating climate adaptation into the national development planning . This policy identifies four priority sectors for adaptation-water resources, health, agriculture, and marine-coastal-and pinpoints priority geographic areas based on climate projections, hazard exposure, and potential economic losses. It also outlines actions to climate-proof infrastructure (for example, adjusting water infrastructure to better cope with floods)<sup>15</sup>.

**Adaptation has also been mainstreamed into Indonesia’s development agenda:** The CRDP is one of the implementing instruments of the national Medium-Term Development Plan (RPJMN 2020–2024), particularly on “National Priority on Building Environment, Increasing Disaster and Climate Resilience”. Thus the RPJMN documents explicitly includes climate adaptation and resilience, and adaptation has been incorporated into the Environmental Protection and Management Law. An NDC Adaptation Roadmap has also been developed to guide achievement of adaptation targets. Looking further ahead, Indonesia’s Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR) sets a goal for adaptation to reduce climate-related GDP losses by about 3.45% in 2050 by increasing resilience in four basic necessity domains (food, water, energy, and environmental health) across economic, social, and ecosystem dimensions<sup>16</sup>. These national policies and commitments provide an enabling framework for sub-national adaptation efforts.

### 3.1 Alignment with key policies

#### 3.1.1 Nationally Determined Contribution (NDC)

**Indonesia’s Second NDC (SNDC), submitted in 2025, is an update to the 2022 Enhanced NDC and the 2015 NDC.** It raises 2030 mitigation targets to 31.89% (unconditional) and 43.20% (conditional) below BAU and emphasizes adaptation through three resilience pillars: economic resilience, social and livelihood resilience, and ecosystem and landscape resilience . These adaptation pillars are directly relevant to BRAVE’s focus on flood resilience, livelihoods, and ecosystem restoration. Complementing this, Indonesia’s *Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR) 2050* provides a vision to reduce climate-related GDP losses (up to 3.45% of GDP by 2050 without adaptation) through systemic resilience across food, water, energy, and health.

#### 3.1.2 National and Regional Climate Policies and Plans

**Indonesia’s *Climate Resilience Development Policy (CRDP) 2020–2045*, issued by Ministry of National Development Planning (Bappenas) is mainstreamed into the RPJMN 2020-2024 and become one of the national development priorities.** It identifies water resources, health, agriculture, and marine/coastal systems as four key resilience sectors and lays out a multi-book framework covering priority locations, institutional roles, financing strategies, and monitoring and evaluation . As one of the national development priority agendas, CRDP is a program/activity that needs to be carried out by the National

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<sup>15</sup> Climate Resilience Development Policy 2020-2045

<sup>16</sup> INDONESIA Long-Term Strategy for Low Carbon and Climate Resilience 2050

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and Local Governments, and/or strategic business entities in the priority locations to support the achievement of the national climate resilience development agenda<sup>17</sup>. The CRDP is therefore the central national framework within which BRAVE is situated.

The Ministry of Environment and Forestry (now Ministry of Environment) through Ministerial Regulation No. 12/2024 governs the implementation of Enhanced Nationally Determined Contributions. It serves as a national framework for NDC implementation, emphasising cross-sectoral coordination, integration of target into development planning, stakeholder engagement, and also the urgency of measures to strengthen community adaptive capacity to address climate risks<sup>18</sup>.

At the sub-national level, Central Java Province and its north coast districts (Pekalongan City, Pekalongan Regency, Batang Regency, among others) launched a Regional Action Plan for Climate Change Adaptation (RAD-API) in 2024. This multiple municipalities initiative explicitly recognizes the need of joint planning and coordinated governance to combat effects of climate change.

### 3.1.3 Development Planning Frameworks

**Climate action is mainstreamed through Indonesia's hierarchical planning system:**

- The RPJPN 2025–2045 (*Law No. 59/2024*) establishes “Golden Indonesia 2045,” explicitly prioritizing climate resilience and disaster risk reduction within long-term national development.
- The RPJMN 2025–2029 (*Presidential Decree No. 12/2025*) provides medium-term priorities for ministries, including the integration of climate risk and low-carbon development into core programmes. This follows the earlier RPJMN 2020–2024 which mainstreamed climate resilience as a national development priority.
- At the regional level, RPJPD (*Rencana Pembangunan Jangka Panjang Daerah*) is a long-term (20-year) plan, while RPJMD (*Rencana Pembangunan Jangka Menengah Daerah*) is a medium-term (5-year) plan that provides a detailed roadmap for regional development based on the broader vision and mission set out in the RPJPD and serve as the binding frameworks for provinces and districts.
- In the BRAVE project area,
  - Pekalongan City's RPJMD 2021–2026 (*Perda No. 8/2021*) and Pekalongan Regency's RPJMD 2021–2026 (*Perda No. 5/2021*) both commit to flood management, environmental preservation, and climate resilience actions. The new RPJMD for 2025–2029 cycle is currently under preparation for both municipalities.
  - Batang Regency's RPJMD 2017–2022 was the last completed cycle; its successor (2025–2029) is under preparation to align with RPJPN 2025–2045 and RPJMN 2025–2029.

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<sup>17</sup> Climate Resilience Development Policy 2020–2045

<sup>18</sup> Regulation of the Minister of the Environment of the Republic of Indonesia no. 12 of 2024 concerning the implementation of Nationally Determined Contribution in handling climate change.

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This policy architecture provides the enabling environment for BRAVE: national NDC and CRDP commitments set the framework, the RAD-API provides a regional implementation channel, and the RPJMDs ensure integration into legally mandated local budgets and development programmes.

## 3.2 Alignment with key laws and regulations

### 3.2.1 Presidential Regulations

**Perpres 18/2020 (RPJMN 2020–2024)** establishes climate resilience and disaster risk reduction as national development priorities and mandates sectoral integration (water, agriculture, health, coastal/marine). This is the umbrella under which BRAVE's adaptation and risk-informed planning can be mainstreamed.

**Perpres 98/2021 (Nilai Ekonomi Karbon/NEK)** creates Indonesia's carbon-pricing and national registry/MRV framework to achieve NDC targets. While mitigation-oriented, it underpins climate governance and financing coherence that BRAVE can align with (e.g., programmatic MRV/registry linkages).

**Perpres 79/2019 (Percepatan Pembangunan Ekonomi di Klaster Jawa Tengah)** designates priority economic development clusters along the North Coast corridor adjacent to Petanglong. The regulation drives large works (transport, drainage, ports) that BRAVE complements with IWRM, nature-based runoff management, and resilient livelihoods noted in your concept note.

### 3.2.2 Provincial and District-Level Regulations

#### Provinsi Jawa Tengah (Central Java)

- **PERDA Prov. Jateng 6/2024 (RPJPD 2025–2045)** sets the province's 20-year development vision aligned with RPJPN 2025–2045; provides the long-term legal hook for embedding watershed/climate resilience outcomes (e.g., IWRM, blue-green space) across cycles.
- **PERGUB Jateng 12/2023 (RPD 2024–2026)** governs interim regional planning and makes climate/disaster resilience part of program structuring pending the new RPJMD.
- **PERGUB Jateng 21/2024 & PERGUB 19/2025 (RKPD 2025 & amendment)** are annual work-plan regulations that operationalize budget items; they are the direct vehicles to program RAD-API actions, watershed interventions, and BRAVE-type activities each fiscal year.
- **RAD-API Pantura (2024 launch)**- the province and 5 coastal cities (incl. Kota Pekalongan, Kab. Pekalongan, Kab. Batang) launched Regional Action Plans for Climate Change Adaptation to coordinate upstream-downstream and coastal actions across borders-an immediate interface for inserting BRAVE outputs.

#### Kota Pekalongan (City)

- **PERDA Kota Pekalongan 8/2021 (RPJMD 2021–2026)** is a medium-term plan with chapters on flood management, environmental quality, and coastal resilience.
- **PERDA Kab. Pekalongan 5/2021 (RPJMD 2021–2026)** aims to develop superior and competitive human resources, with basic needs both material and spiritual met.
- **PERDA Kab. Batang 10/2024 (RPJPD 2025–2045)** establishes the legal basis for carbon pricing mechanisms like carbon trading, result-based payments, and carbon levies, aiming to foster a green economy and meet climate commitments like the Paris Agreement.

### 3.3 Related projects

#### 3.3.1 Projects with direct scale-up and/or complementarity

The BRAVE project is strategically positioned to leverage and expand on the work of its implementing partners and other local non-governmental organizations. This deliberate design ensures that it is not a redundant effort but a necessary next step that builds on existing momentum.

- **Zurich Flood Resilience Alliance (ZFRA) Program**
  - **Project Profile:** Implemented by Mercy Corps Indonesia (MCI), a partner organization, this program commenced in 2019 and has since evolved into the Zurich Climate Resilience Alliance Program, which launched its first cycle for the period 2024 to 2027. It focused on science-based policy advocacy, using its CRIA findings to enrich local and provincial policies and foster transboundary governance. The program also piloted resilient livelihood initiatives in 8 villages, focusing on climate-smart agriculture and adaptive aquaculture.
  - **Alignment and Complementarity:** The BRAVE project is a direct strategic continuation and scale-up of the ZFRA program's on-the-ground work. This relationship signifies that BRAVE's core hypothesis has already been de-risked and validated by the ZFRA pilot. ZFRA provided the proof of concept, demonstrating the viability of the livelihood models and the effectiveness of science-based advocacy. BRAVE now provides the institutional and financial mechanism to replicate these proven models, strengthen ZFRA-formed community groups, diversify the livelihood commodities and broaden the geographical scope to a full watershed-level program across two targeted watersheds. The continuity of the implementing entity (MCI) and the accredited entity (Kemitraan) provides a strong institutional framework, ensuring that lessons learned are directly applied and that the transition from pilot to full-scale program is seamless.
- **Adaptation Fund (AF) Project: '3S Approach to Build Coastal City Resilience'**
  - **Project Profile:** A US\$6 million project implemented by The Partnership for Governance Reform (Kemitraan), the accredited entity for BRAVE, in eight *kelurahan* (villages) in Pekalongan City since 2021. Its interventions are primarily focused on downstream, coastal resilience and employ a mix of technical and nature-based components. These include mangrove restoration, urban farming, silvofishery, and the construction of breakwaters.

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- **Alignment and Complementarity:** The BRAVE project is meticulously designed to work in synergy with the AF project rather than duplicating its efforts. The AF project concentrates its efforts on the coastal region, but as the document notes, it has become evident that this downstream-only approach offers a temporary solution that fails to address the root causes of flooding stemming from upstream regions. BRAVE's landscape approach provides the missing link, addressing the upstream drivers of flood risk through land management and agricultural practices, therefore creating a more holistic and lasting solution.
  - **Other Initiatives:**
    - **Relung Foundation: Petungkriyono Essential Ecosystem Region (EER)**
      - **Project Profile:** A foundation focused on conservation efforts in the upstream Petungkriyono sub-district. It advocates for policy to legally protect the area's ecologically critical state, which is threatened by the expansion of agriculture and settlement.
      - **Alignment and Complementarity:** The BRAVE project's climate-smart agriculture and land management activities aligns with the EER objectives of preserving Petungkriyono ecosystem . By introducing sustainable agricultural practices and participatory land use planning, BRAVE provides a viable livelihood alternative for upstream communities, thereby preventing the expansion of farming into protected forest areas.
    - **Bintari Foundation: Mangrove Ecosystem Preservation**
      - **Project Profile:** This foundation is engaged in mangrove planting and preservation campaigns in coastal villages like Api-api and Pecakaran.
      - **Alignment and Complementarity:** The BRAVE project's adaptive aquaculture activities are complemented by Bintari's mangrove planting.

### 3.3.2 Projects with strategic risks and divergence

While the BRAVE project is aligned with many initiatives, it exists within a larger context that includes government projects based on a different approach to flood management. These projects are mentioned below:

1. **Drainage Management of Breml-Meduri and Loji-Banger Sub-systems**
  - **Project Profile:** Implemented by the Central Java Province Government, this project focuses on structural solutions such as pumping systems, sluice gates, and river normalization.<sup>19</sup>
  - This project may alter the hydrological flow within the BRAVE project site boundaries, including seawater circulation, which is critical to aquaculture activities, therefore impacting upon the aquaculture intervention proposed by the BRAVE project. Further, the development may also impact the location of

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<sup>19</sup> BRAVE GCF Concept Note

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aquaculture ponds due to the potential establishment of new buffer zones or restricted areas for aquaculture or other activities.

## 2. Onshore Port Development

- **Project Profile:** A Ministry of Marine and Fisheries project to build a port near the Loji-Banger River estuary.<sup>20</sup>
- Similar to above, this project may pose impacts upon the aquaculture interventions proposed as part of the BRAVE project.

## 3. Proposed Java-wide Sea Wall

- **Project Profile:** This is a US\$80 billion project proposed by the Indonesian government to build a 700-kilometer sea wall along the Java coast.<sup>21</sup> Its purpose is to combat land loss from rising sea levels and land subsidence due to groundwater extraction, and a new government agency has been inaugurated to oversee the initiative. However, despite its potential to significantly alter the hydrodynamic of coastal area across the north coast of Java, to date there is no clear and detailed information regarding the plan and implementation for this project.

### 3.3.3 Broader programs on livelihood resilience

The Petanglong area is not just a climate change hotspot; it is also a hub for rapid, large-scale economic and social development. Understanding these broader programs is crucial for contextualizing the BRAVE project's livelihood and water management strategies.

- **Batang Integrated Industrial Zone (KITB)** : This is a major industrial estate in Batang Regency, developed by PT Intiland Tbk, a private sector entity.<sup>22</sup> The KITB is located in a hilly area to minimize flood risk and has its own strict internal water management systems and a wastewater treatment plant. While the KITB's self-contained water management system seems disconnected from the surrounding community, its massive water demand and role in regional labor markets are critical factors that BRAVE's broader integrated water resource management (IWRM) framework must consider.
- **Program Keluarga Harapan (PKH):** This is a national conditional cash program for poverty reduction, which has been found to be effective in helping low-income households recover their financial capital after disasters. However, a study in Pekalongan concluded that while the program provided a temporary safety net, it did not significantly affect human or physical capital for resilience building.<sup>23</sup> The BRAVE project is designed to fill this critical gap, complementing PKH's financial support with long-term capacity building.

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<sup>20</sup> *Ibid.*

<sup>21</sup> <https://indonesiabusinesspost.com/5176/capitol-influence-and-lobbying/indonesia-seeks-global-investors-for-us-80-billion-giant-sea-wall-project>

<sup>22</sup> <https://www.batangindustrialpark.com/en/about-us/>

<sup>23</sup> <https://www.eurekalert.org/news-releases/969627>



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## 4 Project information

### 4.1 Climate rationale

Both the decadal prediction and climate projection scenario conducted as part of the Climate Risk and Impact Assessment of Kupang Watershed in Pekalongan City indicates a consistent trend of increased rainfall. The decadal prediction in particular highlights the probability of monthly rainfall anomaly that shows a trend of Above Normal anomaly, particularly in the upstream and midstream areas of the Kupang River watershed. This trend implies a heightened likelihood for flash floods to occur and affect the midstream and downstream areas. Furthermore, the spatial analysis of long-term climate projections reveals an increase in the likelihood of both intensity and frequency of extreme rainfall events, particularly in the coastal area. This concerning trend exacerbates the currently severe flooding problems in the area, and could result in dire consequences if not addressed promptly and effectively.

Since early 2000s, the Petanglong area (Pekalongan City, Pekalongan Regency and Batang Regency) in Central Java Province, Indonesia, is repeatedly hit by extreme flash and coastal floods that could even reach a daily occurrence. Loss of asset and productive land, damages to infrastructure, disruption of livelihood are among impacts faced by the community. Without strategic actions with visionary view, the severity of these impacts could increase due to abovementioned climatic factors as well as the non-climatic factors. Projection under CRIA of Kupang watershed shows that the inundated area will increase from around 1,800 Ha in 2020 to more than 5,700 Ha by 2035. It will cripple the economy of the Petanglong area and further increasing the vulnerability of their already vulnerable community. The current strategies to address this flood risk are focusing on flood-defence structure. The value of longer-term resilience and nature-based solutions to complement the business-as-usual interventions is often overlooked.

### 4.2 Project objective

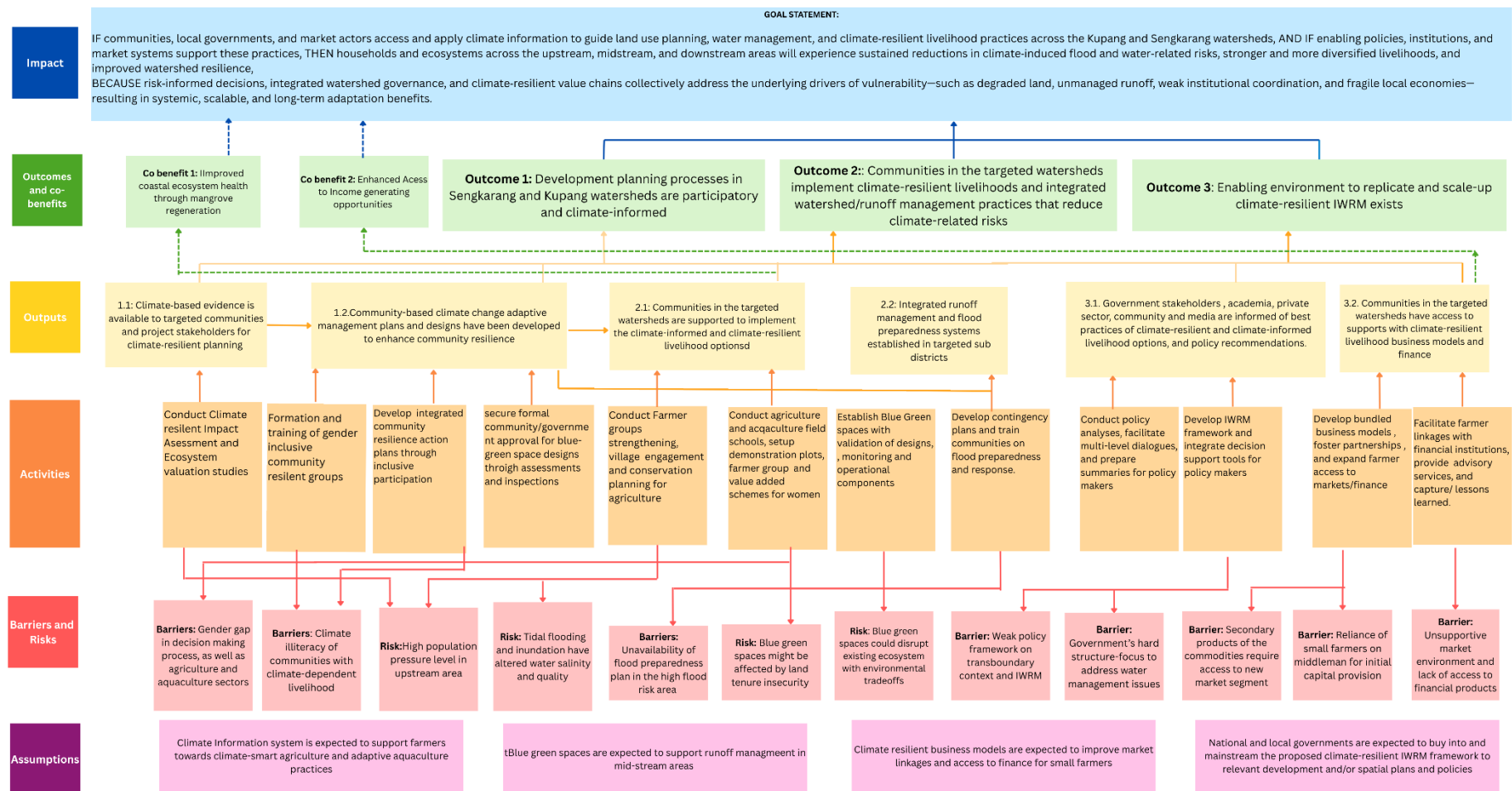
The BRAVE project thus intends to build community's resilience to climate change under flood resilience building framework, by balancing livelihood improvement and ecosystem preservation across Kupang and Sengkarang watersheds in Petanglong area. The BRAVE project will lead a paradigm shift approach to build capacity to take a holistic landscape approach, from reducing upstream watershed risks to coastal resilience. Such role became more apparent when looking at the flood risks from a landscape perspective, and unsustainable land use exacerbates the risk from increased rainfall patterns. The current unsustainable agriculture practise of the upstream community, including improper response to changes in climate variability have caused a decline in their agricultural productivity while simultaneously increasing flood risk in the lower area. In midstream area, runoff rate was increasing due to the increases of built area. While the coastal community is affected the most as they are at risk from losing their houses and aquaculture land

### 4.3 Theory of Change

The BRAVE Theory of Change was revisited through desk review and workshop organized with MCI and Kemitiraan teams in May 2025 with set of recommendations. During the workshop discussion was held on inclusion of gender sensitive activities, further specifying activities in outcome 3 (value chain), adding additional risk and barriers like land tenure security, environment safeguarding and government buy in and ownership for mechanisms

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implemented by BRAVE. In addition, there was discussion on adding co-benefits criterion as per GCF guidelines. The diagram below was finalized and validated.



**Figure 5 BRAVE Theory of Change**

## 4.4 Project logframe

The draft of Project logframe has been developed as part of Annex 2a. This includes matrixes on IRMF and Project Specific Indicators. Both Matrixes are presented as of below:

**Table 1 IRMF Indicators Matrix**

GCF Result Area	IRMF Core Indicators (1-4) <sup>24</sup>	Means of Verification (MoV)	Baseline	Target	
				Mid-term	Final <sup>25</sup>
Total (ARA1 & ARA4)	Core 2: Direct and indirect beneficiaries reached	Mid-line and End-line Surveys, Project Annual and completion reports, Intervention completion reports	0	<b>Total Direct Beneficiaries</b> Male: 25 Female: 17 Total: 42  <b>Indirect Beneficiaries</b> No target	<b>Total Direct Beneficiaries</b> Male: 81,816 Female: 54,544 Total: 136,360  <b>Indirect beneficiaries:</b> Male: 597,596 Female: 605,751 Total: 1,203,347
ARA4 Ecosystems and ecosystem services	Core 2: Direct and indirect beneficiaries reached	End-line Surveys, Project Annual and completion reports, Intervention completion reports		No Mid-term Target	<b>Direct beneficiaries:</b> Male: 81,118 Female: 54,078 Total: 135,196  <b>Indirect beneficiaries:</b> Male: 597,596 Female: 605,751 Total: 1,203,347

<sup>24</sup> The IRMF Indicators are set out in the [Integrated Results Management Framework](#)

<sup>25</sup> The final target means the target at the end of project/programme implementation period. However, for core indicator 1 (GHG emission reduction), please also provide the target value at the end of the total lifespan period which is defined as the maximum number of years over which the impacts of the investment are expected to be effective.

ARA1 Most vulnerable people and communities	Core 2: Direct and indirect beneficiaries reached	<i>Mid-line and End-line Surveys, Project Annual and completion reports, Intervention completion reports</i>	0	<b>Direct Beneficiaries:</b> Male: 25 Female: 17 Total: 42	<b>Direct Beneficiaries</b> Male: 699 Female: 465 Total: 1165  <i>Indirect Beneficiaries</i> Male: 222,530 Female: 217,471 Total: 440,001
ARA1 Most vulnerable people and communities	Supplementary 2.1: Beneficiaries (female/male) adopting improved and/or new climate-resilient livelihood options	<i>Mid-line and End-line Surveys, Project Annual and completion reports, consultation and capacity development reports</i>	0	<b>Direct Beneficiaries</b> Male:250 Female: 166 Total: 416	<b>Direct Beneficiaries</b> Male: 998 Female: 666 Total: 1664
ARA 1: Most vulnerable people and communities	Core 3: Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions	<i>Bill of Quantities (BoQs) and detailed engineering design documents for each blue-green space</i>  <i>Procurement contracts and invoices for construction materials and professional services</i>	0	No mid-term target	Blue green spaces construction cost: 207,941 USD  Cost per blue green space: 51,985 USD
ARA 1: Most vulnerable people and communities	Supplementary indicator 3.1: Change in expected losses of economic	- CRIA reports and economic loss modelling (2020 baseline and 2035 projections)	USD 110.7 million/year (2020) estimated annual economic	No mid-term target	By the end of implementation (2032), project interventions will contribute to a reduction in the

	assets due to the impact of extreme climate-related disasters in the geographic area of the GCF intervention	<ul style="list-style-type: none"> <li>- Updated flood and hydrological modelling conducted during implementation</li> <li>- Project M&amp;E and evaluation reports comparing baseline vs post-intervention scenarios</li> <li>- GIS/flood inundation maps and spatial risk analysis outputs</li> <li>- post-intervention damage and loss assessments (if available)</li> </ul>	loss from flooding  Projected economic losses till 2035- USD 2.2 billion per year		projected annual economic losses from flooding by 2035 compared to the no-project scenario (USD 2.2 billion/year), as measured through data from the Climate Information System, through improved runoff management, enhanced infiltration, and reduced exposure in targeted areas.
ARA4 Ecosystems and ecosystem services	Supplementary 4.1: Hectares of terrestrial forest, terrestrial non-forest, freshwater and coastal marine areas brought under restoration and/or improved ecosystems	Landscape assessment; conservation implementation plans; satellite images	0	925 Ha	3700 Ha

Project specific indicators at the outcome and output level are provided in Table 1. The MEL Plan and logframe provide a detailed list of indicators at the activity level

IRMF Core Indicators (5-8) <sup>26</sup>	Baseline context (Description)	Rating for current state (Baseline)	Target scenario (Description)	How the project will contribute	Coverage
<u>Core Indicator 5: Degree to which GCF investments contribute to strengthening institutional and regulatory frameworks for low emission climate-resilient development pathways in a country-driven manner</u>	Weak institutional structures across watersheds and lack of integration of climate-resilient context in local planning coupled with limited capacity of village and local governments to implement climate-responsive policies.	<u>low</u>	<i>A strengthened provincial policy framework integrating Integrated Water Resources Management (IWRM), integrated watershed management, and climate resilience approaches is formally adopted by the Government and operationalized through relevant sector departments and local governments.</i>	Outcome 3 of the project supports multi-level stakeholder processes to co-create the recommendations for Policymakers to strengthen policy framework with IWRM	<u>National level (one country)</u>
<u>Core Indicator 6: Degree to which GCF investments contribute to technology deployment, dissemination, development or</u>	Limited application of climate-smart agriculture/aquaculture practices and community-based climate decision-support tools (CIS). The	<u>low</u>	<i>Climate Information Services are expanded and contextualized integrating climate forecasts with agricultural advisory</i>	The project will expand and improved CIS, and will build the capacity of local and community stakeholders for using and adopting these	<u>Single sub-national area within a country</u>

<sup>26</sup> The IRMF Indicators are set out in the [Integrated Results Management Framework](#)

<u>transfer and innovation</u>	currently developed CIS is only designed for selected commodities.		<i>services and market information. CIS is accessed and adopted by communities, producer groups, and local authorities to inform climate-resilient agricultural and livelihood decisions.</i>	tools. The system will also be handed over to the local government, and thus they will be trained to manage the system. Advocacy process will further ensure the system can be included in the regular local plan and budget, thus ensuring its sustainability.	
<u>Core indicator 7: Degree to which GCF Investments contribute to market development/transformations at the sectoral, local, or national level</u>	Small scale farmers and fishing communities have limited access to climate-resilient market opportunities; no structured value chains for CSA or aquaculture.	<u>low</u>	<i>4 business models for value chains are developed and adopted by communities as bundled services packages to improve access to finance and market services</i>	The project will deliver climate-resilient livelihood business model that complemented by bundled services which combine technical training, financial access, and institutional support. It will strengthen local capacity in climate-smart aquaculture and agriculture, support	<u>Single sub-national area within a country</u>



				producer groups and value-added groups, and improve access to inclusive financing options	
<u>Core indicator 8: Degree to which GCF investments contribute to effective knowledge generation and learning processes, and use of good practices, methodologies and standards</u>	Learning is fragmented with no centralized knowledge base for local adaptation practices;	<u>low</u>	<i>Knowledge, data, and experiences are shared and accessibility and used for improving local adaptation capacity</i>	A knowledge and learning platform is established to systematically document, disseminate, and exchange climate adaptation knowledge, data, and lessons learned from the project. The platform is accessible to local governments, community organizations, and national stakeholders, and is actively used to inform planning, policy development, and scaling of climate adaptation practices.	<u>Single sub-national area within a country</u>

**Table 2 Project Outcome and Output Indicators**

Project/programme results (outcomes/ outputs)	Project/programme specific Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions / Note
				Mid-term	Final	
<b>Outcome 1</b> <b>Development planning processes in Sengkarang and Kupang watersheds are participatory and climate-informed</b>	Number of watersheds adopting use of CIS information for decision-making processes	Meeting minutes on engagement with watershed management stakeholders  Brief case studies showing the contribution of climate information application in community-based watershed management	0	1 watershed (Sengkarang)	2 watersheds (Sengkarang , Kupang)	<i>Assumptions</i> <i>Watershed management are willing to integrate Climate Information System (CIS) generated through watershed landscape assessment and impact forecasting into their planning processes; highlighting its use as community-based watershed management measures</i>
<b>Output 1.1.</b> <b>Climate-based evidence is available to targeted communities and project stakeholders for climate-resilient planning</b>	Number of Climate risk impact assessments completed for 2 watersheds	<i>Watershed landscape and Livelihoods Resilience assessment reports</i>	0	- 2 watershed assessments (Sengkarang full, Kupang updated)	- 2 watershed assessments (Sengkarang full, Kupang updated)	<u><i>Assumptions</i></u> <i>climate risk assessment under the project is expected to provide information to the stakeholders with long-term/decadal projections, with the particular focus on linking climate risks with the targeted livelihood</i>  <u><i>Notes</i></u> <i>The full climate risk impact assessment will only be conducted for Sengkarang watershed, while for Kupang watershed the assessment</i>

						<i>will be more of an updated process, considering that a Climate Risk and Impact Assessment for Kupang watershed had been developed in 2020 by ZFRA program</i>
	Ecosystem Valuation Study completed	<i>Ecosystem valuation report</i>	0	<i>Ecosystem valuation study completed</i>	<i>Ecosystem valuation study completed</i>	<u>Notes</u> <i>1 ecosystem service valuation assessment will be conducted in two watersheds Results will be linked to landscape resilience and watershed sectoral assessments to demonstrate the benefits of climate-resilient practices and blue-green infrastructure.</i>
<b>Output 1.2 Community-based climate change adaptive management plans and designs have been developed to enhance community resilience</b>	Number of climate resilient community participatory groups formed	<i>Community groups formation documentation</i>	0	15 resilient community groups (1 per village, covering 15 members in each group)	33 resilient community groups (1 per village, covering 15 members in each group)	<u>Assumptions</u> <i>Participatory mapping will help to determine Community members that will be suitable to participate in climate resilience groups. Sufficient time and resources will be available for their training and capacity building.</i> <u>Notes</u> <i>33 community resilient groups (15 members each) in 33 villages will be formed which will cover upstream, mid-term and downstream areas.</i>
	Number of community group members	<i>Capacity building reports</i>	0	270 members of climate	495 members of climate resilient groups trained	<i>495 community members which are part of 33 community resilient groups</i>

	reporting increased knowledge in relevant training areas	<i>Record of participants attending trainings</i>		resilient groups trained (Male: 160, Female: 108)	(Male: 297, Female: 198)	<i>will be trained. Each group will have 15 members which will be trained.</i>
	Number of integrated community resilience action plans developed	integrated community resilient action plans	0	15 integrated community resilience actions	33 integrated community resilience action plans	<p><u>Assumptions</u></p> <p><i>Stakeholders recognize the importance of integrated planning and are committed to inclusive, gender-sensitive approaches. Plans are expected to be adopted and used by local authorities and community groups.</i></p> <p><u>Notes</u></p> <p><i>A total of 33 integrated community resilience action plans will be prepared across 33 villages within two watersheds.</i></p> <ul style="list-style-type: none"> <li><i>8 plans will focus on blue-green space design and management.</i></li> <li><i>25 plans will focus on integrated land use and resilient livelihood planning.</i></li> </ul>
<b>Outcome 2 Communities in the targeted watersheds implement</b>	Average agricultural productivity (tonnes per hectare)	<i>End-line report FDGs with beneficiaries' farmers</i>	0.9 tonnes/hectares	No mid-term target	Agriculture: 2.5 tonnes /hectares	<p><u>Assumptions</u></p> <p><i>Through improved behaviour change through climate resilient practices, agriculture communities will witness increase in agriculture and aquaculture yield</i></p>

climate-resilient livelihoods and integrated watershed/runoff management practices that reduce climate-related risks						<p><i>Notes</i></p> <p><i>No mid-term target is set, but based on value chain assessment study a indicative of improvement of yield is set for agriculture (2.5 tonnes/ hectares)</i></p>
	Average aquaculture productivity (tonnes per hectare)	<p><i>End-line report</i></p> <p><i>FDGs with beneficiaries' farmers</i></p>	1.5 tonnes/hectares	No mid-term target	Aquaculture: 2.5 tonnes/per hectares	<p><i>Assumptions</i></p> <p><i>Through improved behaviour change through climate resilient practices, aquaculture communities will witness increase in agriculture and aquaculture yield</i></p> <p><i>Notes</i></p> <p><i>No mid-term target is set, but based on value chain assessment study a indicative of improvement of yield is set for aquaculture (2.5 tonnes/ hectares)</i></p>

	Water infiltration rate in blue green spaces for runoff management	<i>End line report Baseline report Technical feasibility reports</i>	<i>TBC</i>	<i>No mid-term target</i>	<i>Target to be defined upon completion of baseline and selection of blue green spaces sites</i>	<p><i>Assumptions</i> Blue–green interventions are expected to improve infiltration and reduce runoff over time, with gradual initial gains dependent on vegetation establishment and maintenance.</p> <p><i>Notes</i> The baseline for water infiltration rate will be collected in baseline study in inception stage and targets will be determined once blue green space sites are selected.</p>
	Soil organic carbon (SOC) content rate in blue green spaces for improved land management	<i>End line report Baseline report Technical feasibility reports</i>	<i>TBC</i>	<i>No mid-term target</i>	<i>Target to be defined upon completion of baseline and selection of blue green spaces sites</i>	<p><i>Assumptions</i> Soil organic carbon is expected to increase progressively through restoration and improved land management, depending on sustained application of practices and local conditions.</p> <p><i>Notes</i> The baseline for soil organic carbon rate will be collected in baseline study in the inception stage stage and targets will be determined once blue green space sites are selected.</p>
<b>Output 2.1 Communities in</b>	Number of Blue green spaces sites approved				<i>4 permission letters</i>	<i>Assumptions</i>

the targeted watersheds are supported to implement the climate-informed and climate-resilient livelihood options		Signed Permission letters for approved blue green spaces sites	0	4 permission letters		<p>village authorities, local residents, and municipal governments through inclusive participation and risk perception analysis are satisfied with selection process for blue green spaces sites and willing to give formal consent for selection of blue green spaces sites</p> <p>Notes</p> <p>approval of 4 blue green spaces sites will be secured through public consultations with government and communities</p>
	Number of climate smart agriculture field schools implemented for agriculture and aquaculture farmer groups	<p>Field school documentation (photos)</p> <p>Field school training reports</p>	0	<p><b>Agriculture:</b> 2 Field school (1 for carrot, 1 for coffee)</p> <p><b>Aquaculture:</b> 2 aquaculture field schools</p>	<p><b>Agriculture:</b> 4 Field School (2 for carrot, 2 for coffee)</p> <p><b>Aquaculture:</b> 3 aquaculture field schools</p>	<p><u>Assumptions</u></p> <p><b>Agriculture:</b> Farmer field schools are expected to equip farmers with best CSA practices on climate risk awareness, resilient crop and soil management, efficient water use, integrated pest management and use of Climate information system</p> <p><b>Aquaculture:</b> Aquaculture Farmer Field Schools are expected to equip fish farmers with best CSA practices on climate risk awareness, resilient pond and water management, efficient feed and input use and</p>

						<p>adaptive techniques such as pond diversification and salinity control.</p> <p><u>Notes</u></p> <p><b>Agriculture:</b> 4 Commodity specific field schools will be implemented during different stages of the project. Based on the dynamics of each village, commodity specific farmer field schools will be implemented in 15 villages. These 15 villages will have support through CIS for agriculture activities</p> <p><b>Aquaculture:</b> 3 Commodity specific field schools will be implemented during different stages of the project</p>
	<p>Number of trained farmers reporting increased knowledge of CSA practices (disaggregated by farmer group and gender)</p>	<p>Training reports</p> <p>List of farmers trained</p>	0	<p><b>Agriculture:</b> 150 farmers trained (≥40% women)</p> <p><b>Aquaculture:</b> 80 aquaculture farmers trained (≥40% women)</p>	<p><b>Agriculture-</b> 300 farmers trained (≥40% women)</p> <p><b>Aquaculture:</b> 160 aquaculture farmers trained (≥40% women)</p>	<p><u>Assumptions</u></p> <p>It is expected Farmers selected for CSA trainings will be willing to further utilize trainings for improved productivity and climate resilient livelihood development</p> <p><u>Notes</u></p> <p><b>Agriculture:</b> 300 farmers will be trained from 15 villages in upstream and mid-term areas</p>



						<b>Aquaculture:</b> 160 farmers will be trained from 10 villages for aquaculture in downstream areas. These 10 villages will have support through CIS for agriculture activities
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	Number of demonstration plots established for agriculture and aquaculture practices	GPS coordinates and geo-referenced maps of plot locations Plot design/layout sheets Demo plot records Field verification	0	<b>Agriculture</b> 4 agriculture demo plots established  <b>Aquaculture:</b> 4 aquaculture demo plots established	<b>Agriculture:</b> 9 agriculture demo plots established  <b>Aquaculture:</b> 8 aquaculture demo plots established	<u>Assumptions</u> suitable land and resources for agriculture and sites for aquaculture will be made available for demonstration plots, and that farmers will actively participate in showcasing and testing improved agriculture practice  <u>Notes</u> <b>Agriculture:</b> 9 Demonstration plots will be established within vicinity of 15 upstream and mid-stream villages selected for agriculture interventions  <b>Aquaculture:</b> 8 Demonstration plots will be established within vicinity of 10 villages
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	Number of gender inclusive farmer groups strengthened in financial literacy and	Capacity-building session records	0	<b>Agriculture:</b> 3 farmer groups capacity improved	<b>Agriculture:</b> 6 farmer groups capacity improved	<u>Assumptions</u> It is assumed that farmer groups are active, inclusive, and willing to adopt climate-resilient practices
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	<i>business management skills</i>			<b>Aquaculture:</b> 2 <i>aquaculture groups capacity improved</i>	<b>Aquaculture:</b> 4 <i>aquaculture groups capacity improved</i>	<u>Notes</u> <b>Agriculture:</b> 6 farmer groups will be strengthened within vicinity of 15 targeted villages  <b>Aquaculture:</b> 4 farmer groups will be strengthened within vicinity of 10 targeted villages
	<i>Number of participatory climate resilient conservation plans developed</i>	<i>-Final conservation plans with community endorsement</i> <i>-Record of consultations and validation of conservation plans</i>	0	7 conservation plans developed	15 conservation plans developed	<u>Assumptions</u> It is assumed that technical expertise and stakeholder participation will be available to develop high-quality, context-specific conservation plans.  <u>Notes</u> 15 conservation plans will be developed for 15 agriculture intervention villages. Implementation of conservation plans will be tracked at outcome level
	<i>Number of trained woman farmers reporting increased knowledge of implementing value added scheme</i>	<i>Capacity building session reports</i> <i>Attendance record of women trained</i>	0	<i>no mid-term target</i>	60-woman involved in value-added scheme trained	<u>Assumption</u> It is assumed that women will be willing to participate in value-added training schemes, and that enabling socio-cultural norms will allow for it.  <u>Notes</u>

						15 women from 4 villages will be trained for value added schemes
<b>2.2: Integrated runoff management and flood preparedness systems established in targeted sub districts</b>	Number of blue-green space designs validated by local stakeholders	<i>Approved blue green spaces design reports</i>	0	2 approval letters	4 approval letters	<u>Assumptions</u> landowners and community members are supportive of proposed project activities and satisfied with designs of blue green spaces <u>Notes</u> Public consultations will be carried out with communities and government which will inform validation of designs of blue green spaces
	Number of blue-green spaces established through management working groups		0	2 blue green spaces established	4 blue green spaces established	<u>Assumption</u> Technical designs will be available for establishing blue–green spaces, and that communities and local authorities will support their development. Adequate financing, maintenance arrangements, and institutional coordination are expected to ensure that the spaces function effectively for flood mitigation, runoff management

						<p><u>Notes</u></p> <p>4 blue green spaces will be established.</p> <p>The following criteria will be used for selecting 4 blue green spaces</p> <p><b>Spatial criteria</b>, this includes selecting areas that (1) have ground space or the ability to infiltrate water and reduce runoff, (2) are relatively flat to reduce water movement, and (3) includes a water collection area where the tributaries meet. Areas with a groundwater depth of more than 1 m during the dry season (when it is not raining) have the potential to infiltrate water.</p> <p><b>Existing infrastructure</b>, although the infrastructure required will depend on the final design of the blue-green space and its intended purpose. Factors to consider include level of urban development, population density and demographics, transportation and other access requirements.</p> <p><b>Opportunity to provide environmental and socio-economic benefits</b>, to include biodiversity, improve environmental variables and/or water quality. In</p>
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						<p><i>addition, communities' needs and preferences will be a key criterion, for example, their interest to establish and maintain increased green space.</i></p> <p><b>Meets all regulatory, planning and zoning rules</b>, with all clearances approved prior to the final selection.</p>
	Number of contingency plans developed	Contingency plans documents	0	2 contingency plans developed	4 contingency plans developed	<p><u>Assumption</u></p> <p>Contingency plans are expected to be developed through community inputs and participation</p> <p><u>Notes</u></p> <p>4 contingency plans which will benefit the population in 4 sub districts.</p>
	Number of trained individuals reporting increased knowledge of contingency plans	Attendance sheets of Number of people trained	0	- 200 people trained, male: 120, female: 80 (≥40% women, including vulnerable groups)	- 400 people trained, male: 240, female: 160 (≥40% women, including vulnerable groups)	<p><u>Assumptions</u></p> <p>It is assumed that both men and women will be willing to participate in the flood contingency plan trainings and gender concerns may not affect participation of women and other gender groups/</p> <p><u>Notes</u></p>

						400 people from community groups in 4 sub-districts will be trained in contingency plans
<b>Outcome 3: Enabling environment to replicate and scale-up climate-resilient IWRM exists</b>						
	Government adopts enabling framework for replication and scale-up of climate-resilient IWRM.	IWRM Framework document	0	No-midterm target	1 IWRM framework adopted	<u>Assumption</u> It is assumed that political commitment and policy space will remain favourable for adopting climate-resilient IWRM frameworks. The framework could either lead to a new policy or be used to strengthen the existing policies. Adequate technical evidence, advocacy, and stakeholder consensus will be available to influence decision-making
	Total value (USD) of climate-resilient financial products accessed by farmers/fish farmers	Signed agreements on financial products	0	No midterm target	48,969 USD	<u>Assumption</u> Access to technical advisory services and financial products will translate into utilization as farmers and fish farmers apply acquired knowledge and invest in climate-resilient practices. Initial uptake may be constrained by limited financial literacy, risk aversion, and access barriers; however, utilization is expected to increase over time through demonstration effects, capacity building, and improved

						<p>availability of tailored financial products.</p> <p><u>Methodology</u></p> <p>The average value of financial support is based on prevailing local benchmarks, and it is assumed that accessed finance is primarily used for climate-resilient livelihood investments.</p>
<b>Output 3.1.</b> <b>Government stakeholders, academia, private sector, community and media are informed of best practices of climate-resilient and climate-informed livelihood options, and policy recommendations</b>	<i>Number of policy recommendation summaries shared with policymakers</i>	<i>Policy analysis reports</i> <i>Multi-stakeholder dialogues sessions reports</i> <i>Summary documents with recommendations</i>	0	1 summary developed	2 summaries developed	<p><u>Assumption</u></p> <p><i>evidence-based summaries can be produced which policymakers can access for informed decision making</i></p> <p><u>Notes</u></p> <p><i>3 policy analysis and 10 multi-stakeholder level dialogues will lead to production of summaries for policy makers.</i></p>
	<i>IWRM framework developed through use of decision support tools</i>	<i>IWRM framework document</i>	<i>No prior policy framework draft</i>	<i>1 climate-resilient IWRM framework draft under development</i>	<i>1 climate-resilient IWRM framework developed</i>	<p><u>Assumption</u></p> <p>Technical expertise is available to develop context driven IWRM framework</p> <p><u>Notes</u></p> <p><i>Sector specific decision support evidence reports through Climate information system will be used to develop the IWRM framework</i></p>
	<i>Number of local/provincial policies integrating climate-</i>	<i>Local/provincial policies documents with section on IWRM</i>	<i>local/provincial policies not included</i>	<i>Submission of recommendations to integrate</i>	<i>3 local/provincial policies incorporate IWRM principles</i>	<p><u>Assumption</u></p> <p><i>governments will prioritize holistic water resource management and</i></p>

	<i>resilient IWRM principles</i>		<i>IWRM principles within</i>	<i>IWRM context into the relevant local/provincial policies</i>		<i>climate resilience in their policy agendas, and that coordination mechanisms will support integration across departments.</i>
<b>Output 3.2: Communities in the targeted watersheds have access to supports with climate-resilient livelihood business models and finance.</b>	<i>Number of farmers/fish farmer groups adopting business models</i>	<i>List of farmers/fish farmers groups adopting business models</i> <i>Documentation of services/packages provided to farmer/fish farmers groups in business models</i> <i>Business model documents</i>	<i>No villages piloting business models</i>	<i>No mid-term target</i>	<i>4 farmer/fishfarmers groups adopting business models</i>	<u><i>Assumption</i></u> <i>farmer groups will be willing and able to adopt new business models, and enabling conditions—such as access to finance, markets, and technical support—will be present.</i> <u><i>Notes</i></u> <i>4 farmer groups will fall within 25 villages covered by agriculture and aquaculture interventions in outcome 2. These farmer groups will adopt 4 commodity-specific business models</i>
	<i>Number of farmers/fish farmers accessing technical advisory and financial products</i>	<i>List of farmers/fish farmers accessing financial products</i> <i>List of farmers//fish farmer receive advisory services</i> <i>Package of financial products provided to each farmer/fish farmer</i>	<i>Farmers/fish farmers have very limited access to financial products and don't receive advisory services</i>	<b><i>Financial products:</i></b> 200 farmers/fish farmers access financial products <b><i>Advisory services:</i></b> 8 farmers/fish farmers groups receive	<b><i>Financial products:</i></b> 400 farmers/fish farmers access financial products  <b><i>Advisory services:</i></b> 10 farmer/fish farmers groups receive advisory services	<u><i>Assumption</i></u> <i>Sufficient trust is built for farmers to avail and access financial products and advisory services</i> <u><i>Notes</i></u> <i>400 farmers and the 10 farmer groups will fall within 25 villages covered by agriculture and aquaculture interventions in outcome 2</i>



				<i>advisory services</i>		
Co benefit 1: Improved coastal ecosystem health through mangrove regeneration.	<i>Survival rate of planted mangrove species in restored blue-green spaces.</i>	Mangrove monitoring and restoration reports Field ecological survey	No previous intervention in site on mangroves restoration		At least 70–80% survival rate of planted mangrove species in restored sites by project end.	Blue-green space interventions will contribute to improved coastal ecosystem resilience by increasing the survival rate of planted mangrove species,
Co-benefit 2: Enhanced access to income generating opportunities	<i>Number of households reporting increased income through climate-smart value chains.</i>	Mid-term and end-line survey	No integrated interventions focused on financial and market advisory to communities	no-midterm target	520 targeted Households reporting average increase in income by 20% in 25 villages	It is assumed that market demand, financial services, and enabling policies will support uptake of value chains. Farmers will be willing to engage with new opportunities and apply skills learned for income generation .

**Table 3 Implementation plan**

COMPONENTS/OUTPUTS	Year 1				Year 2				Year 3				Year 4				Year 5			
ACTIVITIES	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Component 1: The development planning processes in Sengkarang and Kupang watersheds are participatory and climate-informed</b>																				
<b>Output 1.1.</b> Climate-based evidence is available to targeted communities and project stakeholders for climate-resilient planning.																				
Activity 1.1.1 Conduct climate risk and impact assessment for Sengkarang watershed and updating the climate risk and impact assessment for Kupang watershed																				
Activity 1.1.2. Develop ecosystem service evaluation and valuation assessment																				
<b>Output 1.2.</b> Community-based climate change adaptive management plans and designs have been developed to enhance community resilience																				
Activity 1.2.1. Formation and strengthening of climate-resilient community groups in target villages																				
Activity 1.2.2 Develop community resilience action plans through inclusive stakeholder participation resilience																				

actions.																			
1.2.3 Conduct Hydrological analysis of watershed area to inform development of blue green spaces																			
Activity 1.2.4 Securing approval of blue green spaces sites through stakeholder validation and risk perception analysis																			
Activity 1.2.5 Landscape design of the blue-green																			
<b>Component 2 Communities in the targeted watersheds implement climate-resilient livelihoods and integrated watershed/runoff management practices that reduce climate-related risks</b>																			
<b>Output 2.1</b> Communities in the targeted watersheds are supported to implement the climate-informed and climate-resilient livelihood options																			

Activity 2.1.1 Conduct climate-smart field schools for agriculture and aquaculture to promote climate-resilient farming and adaptive aquaculture practices.																				
Activity 2.1.2 Expand and contextualize the Climate Information System (CIS) to support community resilience action plan implementation across upstream, midstream, and coastal communities, focusing on coffee, carrots, milkfish, and grouper commodities																				
Activity 2.1.3 Build the financial and business management capacity of farmer and fish-farmer groups to function as aggregators for their members .																				
Activity 2.1.4 Implement participatory conservation measures and establish climate smart agriculture demonstration plots .																				
Activity 2.1.5. Establish adaptive aquaculture demonstration plots complemented with																				

improved feeding management practices and introduce value added schemes for women farmer groups																				
Activity 2.1.6 Facilitate village engagement and advocacy in upstream, midstream, downstream and coastal communities to support knowledge exchange with farmer and fish-farmer groups																				

**Output 2.2** Integrated runoff management and flood preparedness systems established in targeted sub-districts

Activity 2.2.1 Conducting sectoral risk and opportunity analysis to inform establishment of Blue green spaces																				
Activity 2.2.2 Provide systems and procedures for monitoring, communication and operational management of Blue- Geen Spaces																				

2.2.3 Securing validation of designs and establishment of blue-green spaces management working groups																				
Activity 2.2.4: Develop sub-district level contingency plans																				
Activity 2.2.5. Train local communities on flood preparedness and response																				
<b>Component 3 Enabling environment to replicate and scale-up climate-resilient IWRM exists</b>																				

**Output 3.1.** Government stakeholders (national, provincial, district, and sub-district levels), academia, private sector, community and media are informed of best practices of climate-resilient and climate-informed livelihood options, and policy recommendations.

Activity 3.1.1 Conduct policy analysis at provincial and local level to inform evidence based policy recommendations																				
Activity 3.1.2 Facilitate multi-level advocacy and policy dialogues to advance the integration of Integrated Water Resources Management (IWRM) principles into local and provincial policies .																				
Activity 3.1.3. Develop and disseminate a summary for policy makers (SPM)																				

based on lessons learned																				
Activity 3.1.4 Co-develop climate-resilient IWRM framework through stakeholder consultation (to integrate landscape and climate resilience perspectives)																				
Activity 3.1.5 Conduct media outreach and visibility campaigns and maintain knowledge repository																				
Activity 3.1.6 Co-develop decision-making tools for sector-specific (CIS) with relevant local partners																				
Activity 3.1.7 Amplify the project learning and evidence to inform the climate resilience policy development at the national level																				

Output 3.2. Communities in the targeted watersheds have access to supports with climate-resilient livelihood business models and finance																			
Activity 3.2.1 Detailed Market scoping analysis both for agriculture and aquaculture commodities																			
Activity 3.2.2 Improve network with offtakers, aquaculture and agriculture input providers.																			
3.2.3 Strengthen networks and facilitate linkages with financial institutions and technical assistance advisory groups, to improve access to finance and market opportunities.																			
Activity 3.2.4 Develop bundled service business models for selected aquaculture and agriculture commodities .																			



3.2.5 Document and disseminate lessons learned on the replication potential of business models																			
3.2.6 Conduct regular monitoring and evaluation on technical performance of the close-loop model																			
<b>Project Monitoring*</b>																			
MEL Plan and Baseline Data Development			Inception report																
CARM Sensitization Workshop																			
CARM and MEL Visibility																			
Periodic Monitoring and Annual Progress Assessment with partners																			
Program Alignment Workshop																			
Stakeholder Advisory Forum																			
Mid-term Performance Monitoring with partners																			
Endline Data Collection and Final Internal																			

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Performance Assessment																				
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APR = Annual Performance Report

\*In addition to this monitoring requirements, the Funded Activity is also subject to financial reporting per the AMA/FAA, such as Unaudited/Audited Financial Statements, Financial information reports, and other reports as defined in the FAA.

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## 5 Pre-feasibility assessment

This section provides an overview of the project design and three interrelated outcomes, and then a detailed feasibility assessment on the two technical components of the project: The blue green spaces and agro-fishery value chains. Separate studies go into both in more details.

### 5.1 Overview of project design

#### Outcome 1: Climate Information-Based Planning and Design

**Background:** This foundational outcome is pivotal for fostering a shift toward risk-informed planning and actions. It provides the scientific basis for the design of all climate-resilient activities to be implemented under Outcome 2. The core of this outcome is the **Landscape Resilience Assessment**, which will be conducted for the Sengkarang watershed and updated for the Kupang watershed, leveraging previous work by the ZFRA program.

A key innovation under this outcome is the development of a sub-seasonal to seasonal (S2S) forecasting method, which will be integrated with local data that can either comes from the Bureau of Meteorological, Climatological, and Geophysics (BMKG) or the installed community-based weather station. This will serve as the basis for an **impact-based forecasting process** that translates complex scientific data into practical, actionable recommendations for local communities. For farmers and fish farmers, this includes guidance on optimal planting and harvesting schedules, feeding and water circulation control, and other climate-adaptive practices. This forecasting process is the basis of a Climate Information System (CIS) to be implemented under Outcome 2.

Beyond the technical component, this outcome includes a crucial **participatory planning process**. Following the assessment, community groups will be actively involved in developing land use, water resource management, and resilient livelihood action plans. This ensures that the design of interventions is not a top-down exercise but is grounded in the needs, concerns, and aspirations of the communities, thereby securing buy-in and ownership.

#### Outcome 2: Resilient Community and Ecosystem

**Background:** This outcome translates the data and plans from Outcome 1 into tangible, on-the-ground interventions. The primary focus is on two key areas: climate-resilient livelihoods and nature-based runoff management. A unified platform of climate information system will complement these focuses as a means to foster risk-informed decision making process.

The project will scale up proven resilient livelihood practices through the implementation of a **Closed-Loop Agriculture principle**. This approach, to be applied in upstream areas, focuses on building a sustainable and integrated agricultural ecosystem where various actors, including farmers, financial service providers, market providers, and technical advisors play defined roles. This system is designed to improve productivity and propel local income, while incorporating nature-based solutions (NBS) like vegetative-based drainage systems to improve soil health and reduce runoff.

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For coastal communities, the project will implement **adaptive aquaculture practices**. This involves applying adaptive and sustainable methods such as floating nets and better feeding management, while also exploring other feasible methods such as pond relocation, silvofishery and others, to enhance productivity and cost-effectiveness in the face of inundation. The project will also attempt to address potential water pollution issue by improving feeding management and water circulation. A value-added scheme for women's groups will be introduced to optimize their role in the supply chain and further improve household income and financial resilience.

For runoff management, the project will establish **blue-green spaces** in midstream areas. These spaces are innovative because they serve a dual purpose: they function as a much-needed green public space for community recreation and, during rainfall events, as a detention pond to manage surface runoff. The design of these spaces will be informed by the flood spatial model from Outcome 1, ensuring they are strategically placed to regulate water flow. A community-based monitoring and communication procedures and sub-district level flood contingency plan will be developed to complement the blue-green spaces, further enhancing flood preparedness in the area.

To complement resilient livelihood practices and runoff management, the current climate information system developed under the MCI/ZFRA program will be expanded through the BRAVE project to cover additional watersheds and commodities. This system will deliver real-time and projected weather and climate data, along with actionable recommendations for agriculture and aquaculture activities related to selected commodities. A market feature is also planned for integration within the system, with its specific functions and feature details to be determined during the implementation phase.

### **Outcome 3: Enabling Environment for Replication and Scale-Up**

**Background:** This outcome is the project's long-term sustainability strategy, designed to ensure that the interventions and lessons from Outcomes 1 and 2 are not only effective but also replicable and scalable beyond the project period.

A critical component of this outcome is the **policy and governance strategy**. The project will leverage the evidence and lessons learned from the first two outcomes to advocate for a climate-resilient IWRM framework. This will involve the co-development of a policy framework with a diverse group of stakeholders, including government, academia, the private sector, and communities. The project will produce summaries for policy makers to translate complex project findings into actionable policy recommendations, advocating for the inclusion of this framework into spatial plans and development policies at the local and provincial levels. Advocacy works at the national level will center on showcasing the mainstreaming of policy frameworks recommendations grounded in local and scientific evidence as a model for best practice at sub-national level.

Equally important is the development of **market-proven business models** for the supported livelihoods. The project aims to create a self-sustaining ecosystem by addressing the financial and technical barriers faced by farmers. This is accomplished through a bundled service scheme that connects communities to financial institutions for feasible and accessible financial products, such as but not limited to microfinance, as well as to technical advisory services. At the core of this business model is also the development of a strong network of market actors within the closed-loop agriculture and aquaculture systems. Key stakeholders to be engaged include financial institutions, input providers, and offtakers

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. The GCF grant will serve as a critical catalyst, providing the seed funding to de-risk these innovative business models and prove their viability to private sector actors.

## 5.2 Blue-green spaces

The project will directly result in more resilient communities and ecosystem including the design (outcome 1) and establishment (outcome 2) of blue-green spaces that will provide nature-based runoff management systems. The project output and activities related to this component include:

**Output 1.4 Blue-green space mapped and designed.** This includes mapping, field inspection and preliminary community discussions to assess the physical and hydrological characteristics of the indicative location(s); Consultations with relevant government departments as above, village head(s) and village residents living within the proximity of the indicative location(s) for socio-economical assessment; Securing permission from village head, village residents, and municipal government (if the final location is local government land) .

**Output 2.3 Runoff management through Blue-Green Spaces established:** This includes the establishment of blue-green space design and management working group consisting of government officials, village representatives, and project team; Physical and hydrological design of the blue-green space; Landscape design of the blue-green space; Provide systems and procedures for monitoring and communication of blue-green space risks; Public consultation for validation of blue-green space design; and the actual blue-green space establishment. We will use monitoring data to refine BGS performance and adjust designs as needed. We will also conduct infiltration tests, soil surveys, rainfall frequency analysis, and peak flow attenuation modelling for BGS design validation.

The project expects to support the design and establishment of four blue-green spaces in Kupang and Sengkarang along with sub-district level flood contingency plans, providing resilience benefits to approximately 172,908 individuals in roughly 43,227 households.

This section provides a deep dive feasibility assessment of blue green spaces for Kupang and Sengkarang including likely benefits and potential risks, and how the project will complete the full design and establishment process.

### 5.2.1 Background information on blue-green spaces

**Background to concept of blue-green spaces:** Blue-green spaces are nature-based solutions for water management, including water retention, redistribution, regulation and recycling<sup>27</sup>. Blue-green spaces not only reduce the risk of flooding but also create other ecosystem services such as biodiversity, natural beauty, food supply, etc<sup>28</sup>

Blue-green spaces involves a broad range of potential interventions involving both ‘blue’ and ‘green’ space management:

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<sup>27</sup> an Noordwijk, M., Bargaes-Tobella, A., Muthuri, C., Gebrekirstos, A., Maimbo, M., Leimona, B., Bayala, J., Xing, M., Lasco, R., Xu, J., & Ong, C. K. (2019). Trees as part of nature-based water management. In M. Van Noordwijk (Ed.), *Sustainable Development through Trees on Farms: Agroforestry in Its Fifth Decade*. (pp. 299–327). World Agroforestry (ICRAF) Southeast Asia Regional Program.

<sup>28</sup> ai, W., & Tan, Y. (2024). Study on Multi-Scenario Rain-Flood Disturbance Simulation and Resilient Blue-Green Space Optimization in the Pearl River Delta. *Buildings*, 14(12). <https://doi.org/10.3390/buildings14123797> J

- Blue space management is managing water bodies such as ponds, rivers, drainage and irrigation channels to reduce the risk of flooding and manage flood events. This can involve creating temporary water storage, drainage and irrigation channels and/or cleaning such channels from sediment and garbage to ensure optimal water storage capacity. It could also include maintaining or improving the condition of the water gates in the drainage channels to prevent flooding from upstream and the entry of high tides continues to function properly. In cases where there are settlements, rainwater harvesting from rooftops and infiltration wells can reduce and slow-down rainfall runoff thereby reducing the risk of flooding.
- Green space management is land cover management to slow down runoff from rain and tide events. This could include tree-based land cover (e.g. agroforestry, mixed garden) management in the upstream and downstream areas to increase infiltration and reduce runoff that causes flooding. It can also involve improving the health of the ecosystem by native vegetation planting, invasive species control and creating diverse micro-habits for wildlife and other such measures.

**Benefits for flood risk reduction:** There is limited national and international research documenting the exact and quantified impact of nature-based solutions, including the type of blue-green spaces included in this project, for flood risk reduction. However, there is some research on the benefits of natural wetlands (of which blue-green spaces are a type of) which shows that they have the ability to retain surface floodwaters, releasing the excess water slowly to downstream areas, while wetland soil provides a considerable amount of floodwater mitigation, holding three to nine times the weight of the soil per unit volume.<sup>29</sup> An impact assessment of wetlands in the US shows that maintaining only 15% of the land area of a watershed its wetlands can reduce flood peaks by as much as 60%<sup>30</sup>.

- ‘Geographically isolated wetlands’ that are densely distributed exert strong hydrological influence on downstream waters by regulating surface water runoff while maintaining groundwater recharge and evapotranspiration under changing (wetter) climate conditions<sup>31</sup>.
- An evaluation of the impacts of a potential hillslope and in-channel natural flood management interventions in Scotland. It would create additional channel and floodplain storage of approximately 70,000 m<sup>3</sup> and a reduction of around 11% in peak discharge. This would reduce flooding in moderate events (but not high magnitude events)<sup>32</sup>.
- Modelling of an existing storage pond located in the middle of a North-East Scotland catchment indicated that there was no significant flow attenuation as a result of the single pond. An additional storage capacity would be required to effectively attenuate the flow especially during the extreme flow events. Model output indicated that significant reduction in the downstream flood peak is possible only if the pond area is increased-ega five-fold increase in pond area would result in a 25% decrease in peak flow<sup>33</sup>.
- A hydrologic comparison between a forested and a wetland/lake dominated watershed in northern Michigan on the magnitude and timing of streamflow from two

<sup>29</sup> [Modeling the hydrological significance of wetland restoration scenarios - ScienceDirect](#)

<sup>30</sup> [Economic Benefits of Wetlands](#)

<sup>31</sup> [Mapping landscape-level hydrological connectivity of headwater wetlands to downstream waters: A catchment modeling approach - Part 2 - ScienceDirect](#)

<sup>32</sup> [Hydrological Processes | Hydrology Journal | Wiley Online Library](#)

<sup>33</sup> [Ghimire: Application of 1D and 2D numerical models... - Google Scholar](#)

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watersheds, showed that the watershed containing greater wetland and lake areas had lower spring peaks and higher sustained flows during summer and fall<sup>34</sup>.

Specifically in Indonesia, field measurements conducted by Brawijaya University (REFF)<sup>35</sup> show that the more trees on the land, the more rainwater is infiltrated. The tree canopies temporarily holds rainwater and the tree roots make the soil more porous

**Other environmental and socio-economic benefits:** Blue-green spaces provide a wide variety of other environmental benefits, in addition to flood risk reduction, although the specific benefits do depend on the design and location of the space. This includes improving water quality, increasing fresh water supply, storing carbon and maintaining biodiversity. A study conducted by Brawijaya University (REFF)<sup>36</sup> showed that the presence of soil cover in the form of vegetation and litter reduces soil erosion, thereby reducing sedimentation in rivers. Reduced erosion causes fertile topsoil to be maintained so that farmers do not need to use excessive fertilizer. Reduced erosion and excessive use of fertilizer contribute to maintaining water quality. Planting vegetation that are habitat for predators of agricultural pests is also useful for maintaining the biodiversity function and reducing the need for pesticides<sup>37</sup>. For designs that involve rainwater harvesting, communities also have an increased supply of freshwater and can reduce utilization of groundwater.

Blue-green spaces also provide a variety of socio-economic benefits, which could include a new/ improved community space that provides a place for the community to gather, exercise and socialize and help improve health and mental wellbeing. The reduction of flooding will also provide significant economic benefits, such as increased property values, reduced infrastructure damage and losses to revenue. Blue-green spaces can open up new or more productive areas, such as riverbanks, for fruit and other crop harvesting, ecotourism.

**Challenges for blue-green spaces.** Despite the proven and documented benefits of blue-green spaces there are a wide range of interconnected factors that have limited their uptake. This includes:

- Land tenure or ownership in the context of providing land for blue-green space.
- Village and community acceptance of green open spaces.
- They require effective cooperation between various institutions and stakeholders, who often have different interests in the space<sup>38</sup>
- There is often limited and gaps in the ecological knowledge of the stakeholders that need to cooperate to design, establish and manage a blue-green space<sup>39</sup>

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<sup>34</sup> [\(PDF\) Hydrologic comparison between a forested and a wetland/lake dominated watershed using SWAT](#)

<sup>35</sup> [https://www.google.com/url?q=https://www.mdpi.com/2073-445X/9/8/240&sa=D&source=docs&ust=1757390679439666&usg=AOvVaw0R\\_QX1OPqCc3IEtITVA7ZN](https://www.google.com/url?q=https://www.mdpi.com/2073-445X/9/8/240&sa=D&source=docs&ust=1757390679439666&usg=AOvVaw0R_QX1OPqCc3IEtITVA7ZN)

<sup>36</sup> <https://www.google.com/url?q=https://www.mdpi.com/2073-445X/9/8/240&sa=D&source=docs&ust=1757390718126866&usg=AOvVaw26ZAUQ5jloz0FIzUXRaS>

<sup>37</sup> <https://www.google.com/url?q=https://www.mdpi.com/2073-445X/9/8/240&sa=D&source=docs&ust=1757390718126866&usg=AOvVaw26ZAUQ5jloz0FIzUXRaS>

<sup>38</sup> Van Noordwijk, M., Bagues-Tobella, A., Muthuri, C., Gebrekirstos, A., Maimbo, M., Leimona, B., Bayala, J., Xing, M., Lasco, R., Xu, J., & Ong, C. K. (2019). Trees as part of nature-based water management. In M. Van Noordwijk (Ed.), *Sustainable Development through Trees on Farms: Agroforestry in Its Fifth Decade*. (pp. 299–327). World Agroforestry (ICRAF) Southeast Asia Regional Program.

<sup>39</sup> Kumar, P., Avtar, R., Dasgupta, R., Johnson, B. A., Mukherjee, A., Ahsan, M. N., Nguyen, D. C. H., Nguyen, H. Q., Shaw, R., & Mishra, B. K. (2020). Socio-hydrology: A key approach for adaptation to water scarcity and

- There is a variety of technical experts and studies required to design a multifunction blue-green space that all stakeholders accept, including those related to the local ecology, stakeholders and modelling
- Lack of accessible/ available finance for establishing and maintaining blue-green spaces, which also relates to the challenges of land ownership and the multiple layers of stakeholders and government entities potentially involved.
- Real and perceived environmental risks for local community and ecosystems.

**Policy, legal and regulatory assessment:** According to the regulation of the Minister of Agrarian Affairs and Spatial Planning or Head of the National Land Agency no. 14 of 2022 concerning the Provision and Utilization of Green Open Spaces, Article 10: The provision of green open space may be subject to incentives in an effort to realize quality open green open space, that may be provided by: the Central Government to district/city governments; district/city governments to other district/city governments; and the Central Government and/or district/city governments to the community.

The incentives referred to: Utilization of abandoned land that has been designated in accordance with statutory provisions; and cooperation in the utilization of land sourced from land banks in accordance with statutory provisions.

There are some specific government regulations concerning blue-green space, including: Open Green Space (Ruang Terbuka Hijau), where Open Blue Space (Ruang Terbuka Biru) is part of Open Green Space. However, legal opinion is required on whether Open Blue Space within the Green Open Space can be considered a reference for the Blue-Green Space.

## 5.2.2 Technical assessment

**The project intends to demonstrate a viable model for preparing and establishing blue-green spaces in Indonesia.** The activities related to the blue-green space are specifically aligned to overcoming the key challenges typical for such spaces. The table below summarizes how the project will address the challenges identified in the previous section. These are explained in more detail in the following sections.

**Table 4 Summary of how the project will address the challenges for blue-green spaces**

Challenge	How the project will address it
Land availability	Blue-green spaces, especially those funded by international donors such as the GCF, need to avoid displacing individuals/ communities and/or reducing access to natural resources. Government land often has informal settlements of people living and working. Therefore, the project will need to carefully select sites that are on government land which is not being

achieving human well-being in large riverine islands. *Progress in Disaster Science*, 8, 100134. <https://doi.org/10.1016/j.pdisas.2020.100134>



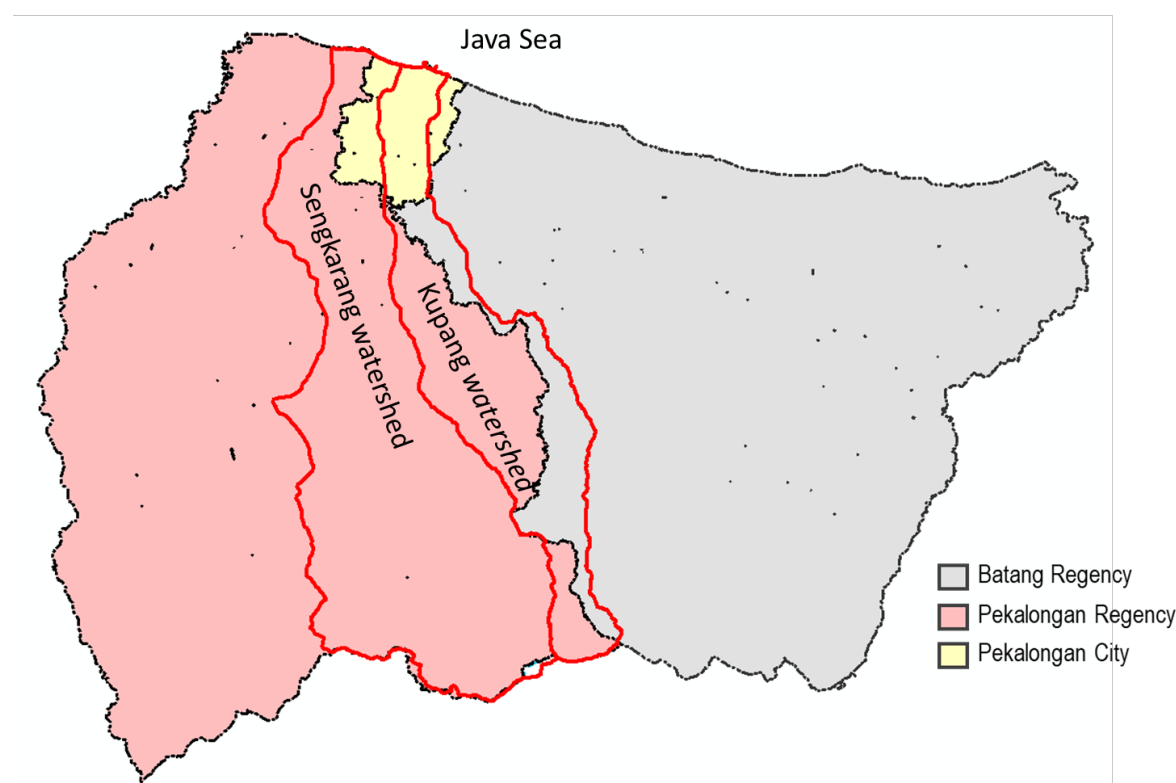
Challenge	How the project will address it
	formally/ informally occupied and/or private land (e.g. farm land) for which the owner is willing to participate in the project.
Community acceptance	A series of steps in the preparation process including engaging and sensitizing villages and community members on the purpose, benefits and any risks associated with blue-green spaces. Only those that are fully committed will be selected as a space.
Stakeholder coordination	A Working Group will be established at beginning of the project to ensure the key government entities at different levels are joined up in their support for the blue green spaces.
Technical knowledge of stakeholders	During the preparatory phase, the project will use different strategies to share information, build awareness and build the skills of key stakeholders that will be involved in preparing and establishing the blue green spaces.
Interdisciplinary expertise required	The project will engage local experts across the disciplines required but also provide international experts to fill any gaps and ensure international best practices are being followed.
Available finance	The project will develop a well-defined strategy to ensure a smooth handover of the facilities from the project to local governments, including village/kelurahan government where the blue-green space will be established. This, along with ensuring community acceptance, is crucial for securing financing for the management and maintenance of the spaces.
Real and perceived environmental risks	A robust environmental and risk monitoring and communication system is included in the blue-green space design.

**Situational Analysis: Kupang and Sengkarang Watershed:** The Kupang and Sengkarang watersheds are two adjacent watersheds in Central Java, sharing similar topography and

environmental, social, and economic challenges. The Kupang Watershed (180.10 km<sup>2</sup>) has a main river, 55.29 km long, that flows into the Java Sea. The Kupang Watershed covers three administrative areas: Pekalongan City, Pekalongan District, and Batang District. Among the three administrative areas, 55.3% of the Kupang Watershed area is in Pekalongan District. The Sengkarang watershed (315.48 km<sup>2</sup>) also flows into the Java Sea, with 95% of the area in Pekalongan Regency, and the rest is in Pekalongan City.

Pekalongan City is the downstream area of these two watersheds, so it is vulnerable to various hydrological problems, especially flooding. Because the upstream and midstream of these two watersheds are in Pekalongan Regency and Batang Regency, solving the flood problem in Pekalongan City requires collaboration from these three regions.

According to BNPB (2020) and Brief Report Hazard, Vulnerability, and Risk Assessment of Kupang Watershed (Mercy Corps Indonesia, 2024), the flooding often experienced in Pekalongan City and Pekalongan District is caused by increased runoff from upstream to downstream and tides from the sea. The areas most affected by the flood were lowland areas, especially downstream from the Kupang and Sengkarang watersheds.



**Figure 6 Location of the Kupang Watershed and the Sengkarang Watershed in Pekalongan City, Pekalongan Regency and Batang Regency**

**Criteria for selecting areas to locate the blue-green space:** The final location of the blue-green spaces will be decided under outcome 1 when the detailed design process will be undertaken. The criteria for which the location will be selected includes:

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- **Spatial criteria**, this includes selecting areas that (1) have ground space or the ability to infiltrate water and reduce runoff, (2) are relatively flat to reduce water movement, and (3) includes a water collection area where the tributaries meet. Areas with a groundwater depth of more than 1 m during the dry season (when it is not raining) have the potential to infiltrate water. These areas typically experience light or no flooding.
  - **Existing infrastructure**, although the infrastructure required will depend on the final design of the blue-green space and its intended purpose. Primarily this relates to how the blue-green space will be connected to the existing water resource or drainage system. In addition, to consider how it fits within wider community infrastructure. Factors to consider include level of urban development, population density and demographics, transportation and other access requirements.
  - **Opportunity to provide environmental and socio-economic benefits**, meaning there is a 'problem' to solve (i.e. a resilience benefit and improved outcome is possible) which could include opportunities to include biodiversity, improve environmental variables and/or water quality. In addition, communities needs and preferences will be a key criteria, for example, their interest to establish and maintain increased green space.
  - **Meets all regulatory, planning and zoning rules**, with all clearances approved prior to the final selection.

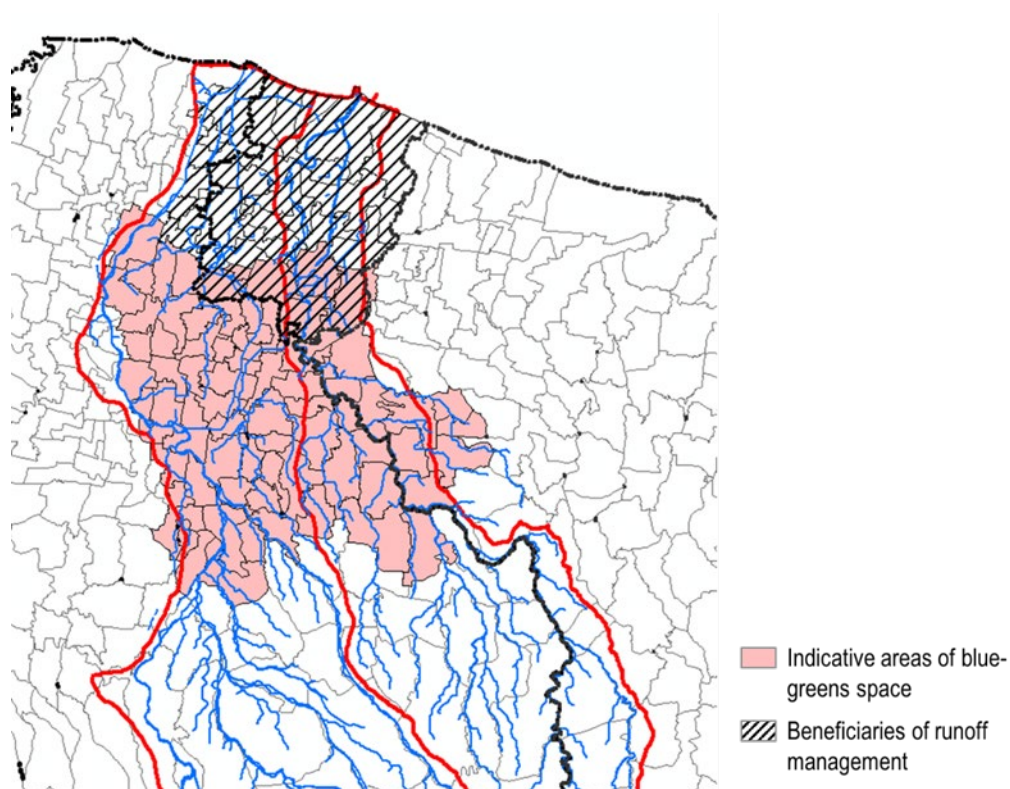
**Equally important is the 'exclusion criteria', to ensure the project meets the C Classification required of SAP projects in terms of environmental and social risks.**

See section 5.2.3 for these exclusion criteria.

**Viability of locations for blue-green spaces.** To assess the potential feasibility of blue-green spaces, an accompanying study has used spatial analysis to assess an indicative set of locations for the space. It has identified four sub-districts that fully meet the different spatial criteria - Karangdadap, Kedungwuni, Warungasem, and Wonopringgo-and some locations in South Pekalongan, Buaran and Tirto.

Based on elevation analysis from DEM data, the Kupang and Sengkarang watersheds have elevations of up to 2,600 meters above sea level, with the lowest points located in coastal areas below sea level. Pekalongan City and Tirto District in Pekalongan Regency, as flood-affected areas, have elevations below 10 meters above sea level. The indicative area for blue-green space development has elevations ranging from 10 to 60.

The figure below presents the location of these sub-districts, together with the area that would benefit from the flood control (Pekalongan City, as well as Buaran and Tirto sub-districts of Pekalongan Regency).



**Figure 7 Sub-districts viable for blue-green space, and areas that will benefit from better runoff management**

Hydrological analysis of elevation and location of tributaries and discussions with the government at the city, regency and sub-district levels further narrowed down some indicative locations at the village level for the blue-green space development. The table below summarizes the villages that were shortlisted as a result of their hydrological analysis and/or the recommendations of government stakeholders. The four that were recommended by both, along with two indicative locations located in the South Pekalongan sub-district have been shortlisted for further assessment.

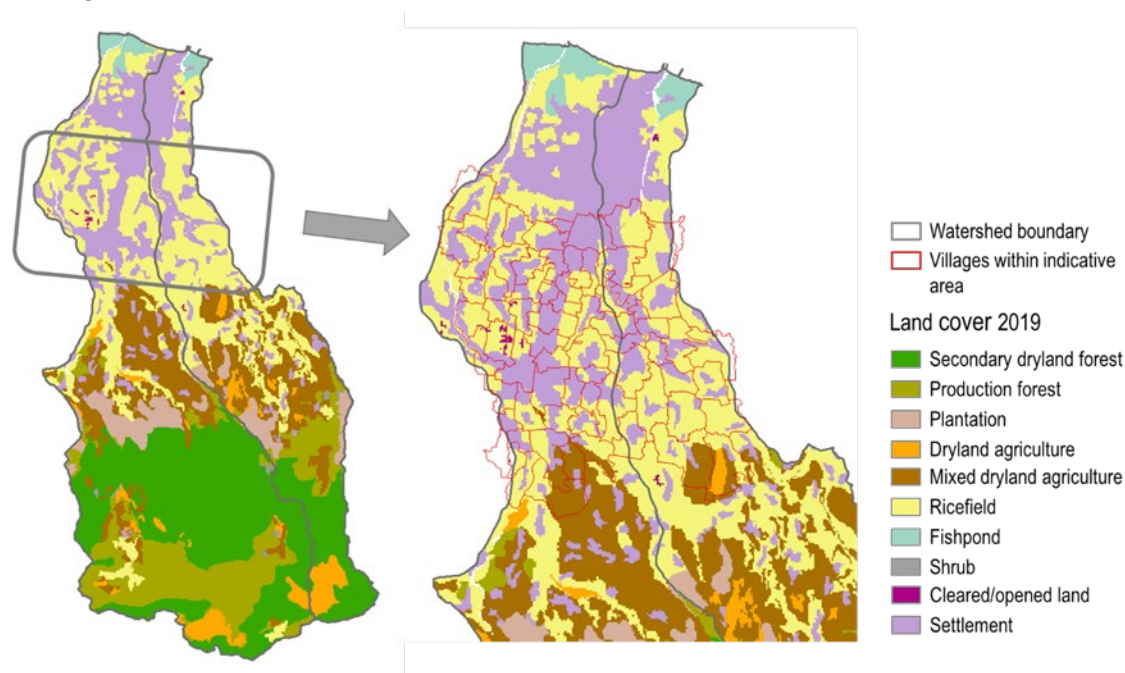
**Table 5 Summary of indicative shortlist of locations for the blue-green space**

Sub-district	Villages	Basis for shortlisting		Tenurial status	Remark	Priority	Landscape design (Section 3.4.2)
		Hydro-logical analysis	Governments suggestion				
Wonopringgo , Pekalongan regency	LEGOK-GUNUNG	X		Government assets	Need to check the Detailed Spatial Planning document to see if there is any government asset land that has not been utilized in that village		Design 1,2,3
	GALANG-PENGAMPON	X	X	Bengkok land	Need permission from village authority	P1	Design 1,2,3
Kedungwuni, Pekalongan regency	KEDUNG-WUNI BARAT	X	X	Bengkok land		P1	Design 1,2,3
	PAKISPUTIH	X		Government assets	Need to check the Detailed Spatial Planning document to see if there is any government asset land that has not been utilized in that village		Design 1,2,3
	PEKAJANGAN		X	Bengkok land	Need permission from village authority		Design 1,2,3
	AMBO-KEMBANG		X	Bengkok land			Design 1,2,3
Karangdadap	PANGKAH	X		Government assets	Need to check the Detailed Spatial Planning document to see if there is any government asset land that has not been utilized in that village		Design 1,2,3
	KALILEMBU	X	X	Bengkok land	Need permission from village authority	P1	Design 1,2,3
Warungasem	MASIN	X	X	Bengkok land		P1	Design 1,2,3
	KALIBELUK		X	Village square	Need permission from village authority and ground checks regarding the surrounding drainage network for inlet-outlet arrangements		Design 3

Sub-district	Villages	Basis for shortlisting		Tenurial status	Remark	Priority	Landscape design (Section 3.4.2)
		Hydro-logical analysis	Governments suggestion				
South Pekalongan	KURIPAN YOSOREJO		X	Tahura	Need permission from the city government and the design needs to be integrated with the Tahura spatial planning. Ground checks regarding the surrounding drainage network for inlet-outlet arrangements.	P2	Design 1
	SOKODUWET		X	City government asset	The land is currently leased to the community for rice cultivation. The blue-green space design can accommodate rice management, allowing water to be used to irrigate the rice fields when needed.	P2	Design 4

**Spatial analysis of indicative locations.** The indicative villages selected for further investigation (see accompanying study) have typical characteristics for these watersheds. This includes:

**Land use:** Rice fields dominate the Kupang Watershed (31% of total land) and secondary forests dominate the Sengkarang Watershed (33% of total land). In Kupang watershed, the next most common type of land cover are mixed dryland agriculture (20% of land), settlements (17%) and secondly dryland forests (14%). In Sengkarang Watershed the other dominating land uses are rice fields (18% of total land), production forests (15%) and settlements (14%)<sup>40</sup>. See figure below for the land use map.



**Figure 8 Land cover 2019 of Kupang Watershed and Sengkarang Watershed<sup>39</sup>**

**Agriculture type:** In terms of the agriculture land, based on field observations, some of the rice fields are rain-fed, while others receive irrigation from local irrigation systems. Vegetation in rain-fed rice fields is sometimes combined or rotated with dryland agriculture.

**Sedimentation:** Both watersheds have relatively flat topography in the downstream area, slightly steep in the midstream and steep to very steep in the upstream. This condition makes the upstream and midstream areas have a high risk of erosion, which affects sedimentation in the downstream areas. Sedimentation in the downstream area decreases the water bodies storage capacity for rain floods from the upstream and tidal floods from the sea. The higher the sedimentation, the smaller the water storage capacity in the downstream area so that flooding can occur when the water accumulation exceeds its storage capacity.

**Tree cover:** The recharge area in the upstream relies solely on forested areas and mixed gardens that still retain trees: the less tree cover, the more runoff generated during rain

<sup>40</sup><https://www.indonesia-geospasial.com/2020/09/download-shp-tutupan-lahan-tahun-2019.html>

events. The midstream areas are dominated by settlement and agricultural land (rice fields and dryland agriculture), which have low water infiltration capacity. According to the Laporan Akhir Pra Kajian Kelayakan dan Analisa Penentuan Lokasi Waduk (Mercy Corps Indonesia, 2022) and information from Kepala Bapperida Kota Pekalongan, the downstream and coastal areas are also experiencing a decrease in groundwater levels due to excessive groundwater extraction. This groundwater extraction accelerates land subsidence, causing parts of the coastal area to become submerged below sea level.

**Flood risk:** As a result of the topography, land use and soil quality and other factors, flooding in the Kupang and Sengkarang watersheds occurs. These causes do not stand alone but all are related, creating complex causal effects.

Two of the indicative locations pre-selected for further feasibility assessment in the implementation period are urban locations in Pekalongan City as part of the shortlist. A detailed hydrological assessment of these locations will be carried out during the implementation period. The Pekalongan City currently lacks vibrant green spaces and faces issues of poor drainage, which increases their vulnerability during rainy period. Establishing a well-designed green space here would offer significant environmental and social benefits.

**Blue-green space design:** During the preparatory phase under outcome 1, the blue green space will be designed in detail. This is limited to the design of natural 'green structures' and not the construction of any grey infrastructure. No grey infrastructure will be constructed using GCF funding. There are a range of considerations in the design of the blue-green space that will determine its effectiveness as a flood control measure (see table below). The design consultation process will also take account of socio-economic characteristics of the prospective area. This includes identifying potential issues and benefits, assessing community willingness and acceptance, considering the accessibility and safety of the sites, among other factors. A key focus will be on GEDS considerations, ensuring that the needs and concerns of gender and vulnerable groups are identified, addressed and integrated into the design solutions.

**Table 6 Technical requirements of blue-green space for flood control**

Technical requirements	Description
Contour of the location	The contours of the land determine whether there are natural depressions or hollows in the area. If so, the inundation area can be focused on that location. If not then the design should create the inundation location.
Amount and type of water sources and inlet	The water sources expected to fill the basin: only rainwater or rainwater and runoff from the location above.
Amount and type of water outlet	To prevent flooding/overflows that could cause disasters in surrounding areas, it is necessary to establish one or more outlets to regulate water levels in the blue-green space. These outlets must be equipped with water gates to regulate water levels in the inundated area. They can be semi-permanent blocking/ gates in the outlet of blue-green space
Maximum capacity of water storage	This capacity can be determined by considering the carrying capacity of the location in relation to the water pressure stored in the area.
Potential integration with other water resource management infrastructure	Water infrastructure can enhance the function of blue-green spaces. For example, the presence of infiltration wells has the potential to increase water storage capacity by accelerating the infiltration process. However, the construction of this



Distance to nearest channel

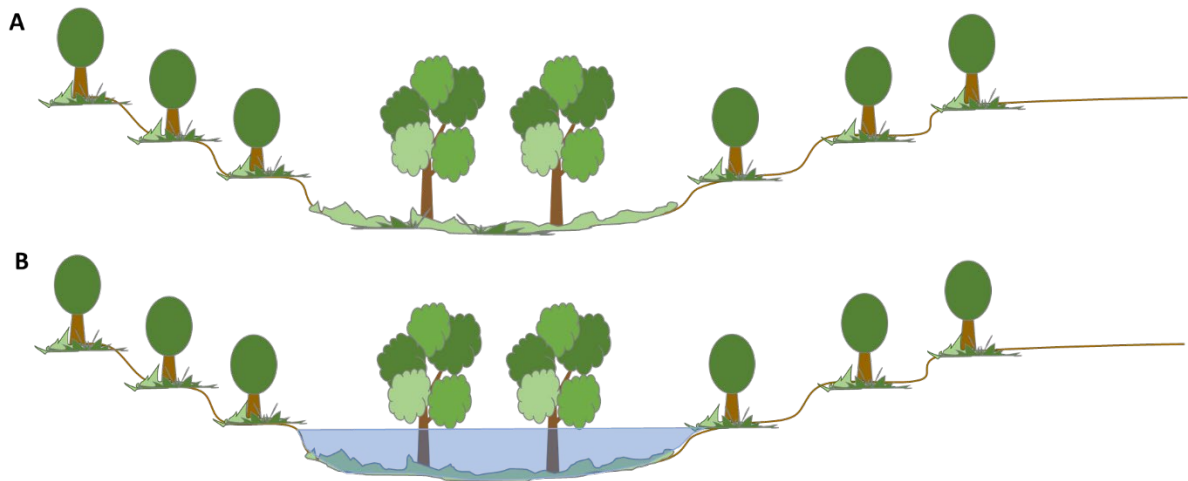
infrastructure requires site feasibility testing, to determine the appropriate infrastructure design. Ideally the blue-green space is integrated in the landscape hydrology system so that it can have a wider impact.

However, to demonstrate the feasibility of such a space, four design options have been prepared which are considered likely options. These have been selected to meet the needs of the indicative villages that have been identified (see previous section) as well as two designs (1 and 3) that are relevant for urban areas. In Section 5.2.3 further details on how the final will be selected, including design exclusion features, are provided.

The four designs are illustrated below, showing the conditions (A) during the dry season and (B) during the rainy season with water inundation as a temporary water storage.

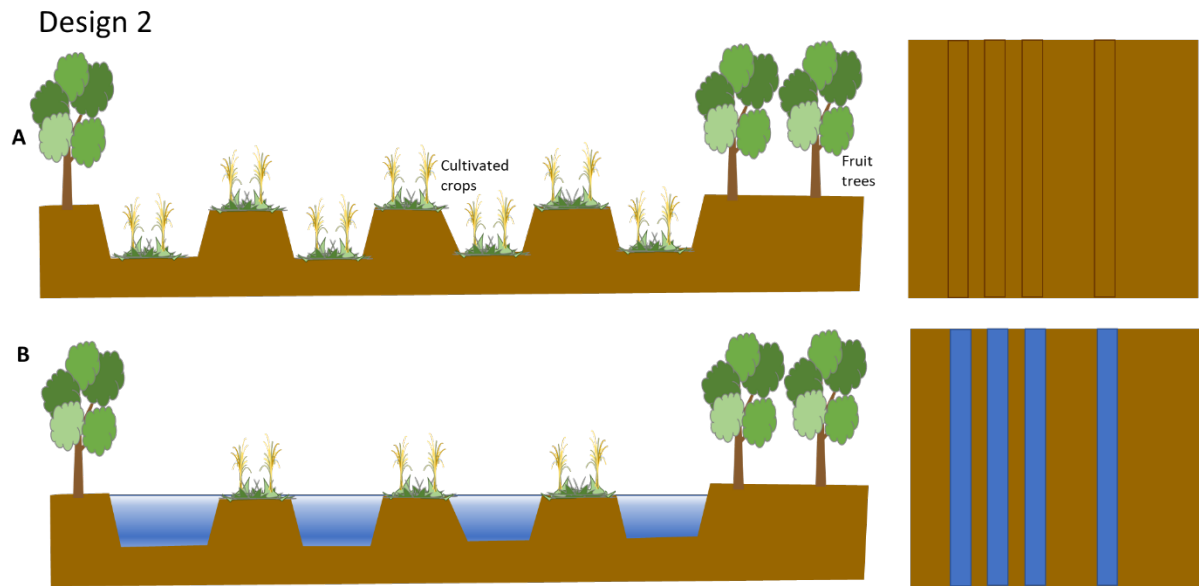
**Design 1:** The blue-green space is part of a city/regency/sub-district or village park. During the rainy season, water is temporarily stored in the dip/lowland part of the park.

Design 1



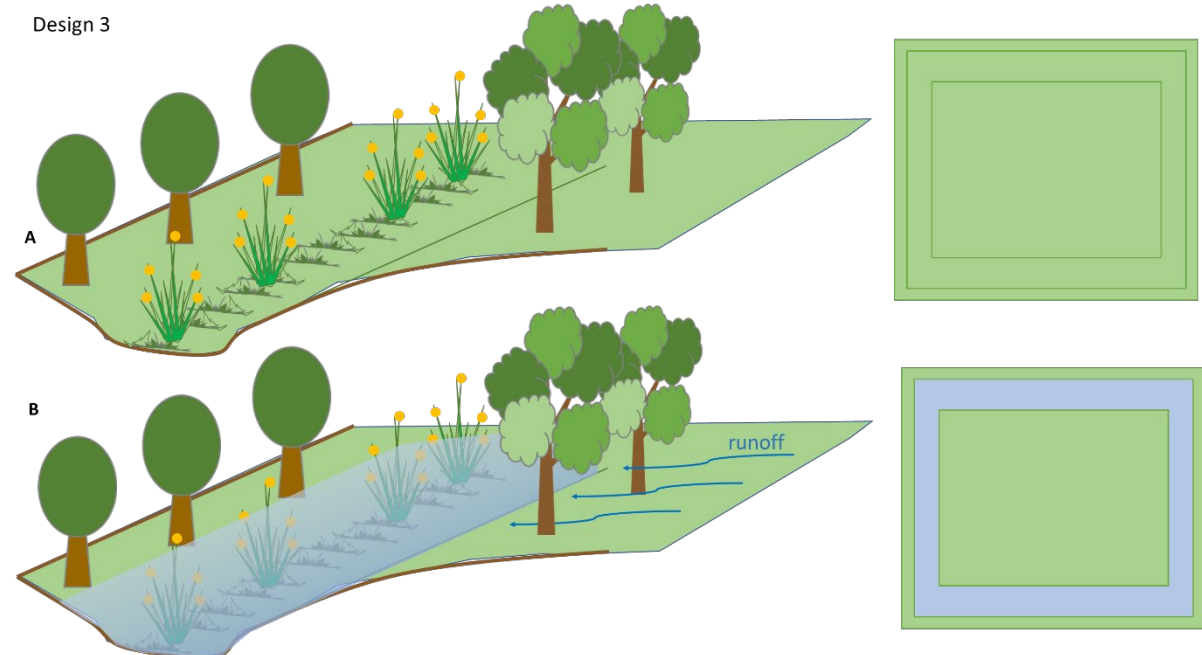
**Figure 9 Illustration of Design Option 1**

**Design 2:** The blue-green space combines gardens and productive land. Agricultural crops can be planted on ridges (guludan) to prevent them from being submerged during rain



**Figure 10 Illustration of Design Option 2**

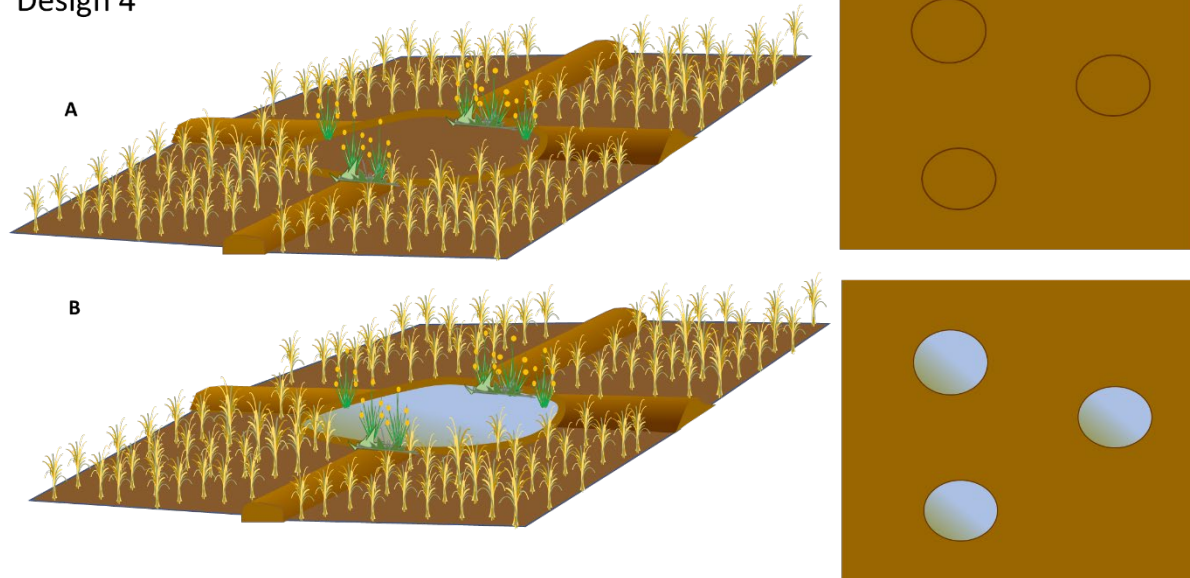
**Design 3:** The blue green space is part of a village/ urban square/ field or other type of common area. During the rainy season water is temporarily stored around the perimeter of the central area so that it can remain in use.



**Figure 11 Illustration of Design Option 3**

**Design 4:** The blue-green space is within an area of rice production. Blue spaces are spread out in the middle of the rice fields and farmers can use these areas to temporarily store water

## Design 4



**Figure 12 Illustration of design option 4**

All of these designs will help to manage runoff and prevent flooding, but they have different types of co-benefits for the local community. Some of these are provided as examples in the table below.

**Table 7 Summary of four indicative design options for blue-green space**

No	Descriptions	Co-benefits
1	Blue-green space is used as a city/regency/sub-district/village park.	People can enjoy the beauty of nature, and it builds social cohesion. Economic benefits from harvesting fruit trees. Increased biodiversity and habitat creation.
2	Blue-green spaces combine gardens and productive land. Agricultural crops can be planted on ridges (guludan) to prevent them from being submerged during rain.	People can enjoy the beauty of nature and builds social cohesion. At the same time, economic benefits from increased crop production during rainy season. Increased biodiversity and habitat creation.
3	Blue-green space is used as a village square	The public can still use the central area for other public activities during the rainy season, thereby strengthening social connections and supports local events. Increased biodiversity and habitat creation
4	Blue-green space is in areas with rice fields or agricultural gardens.	Farmers can utilize blue spaces as water storage for irrigation and to moisten the surrounding soil, and could provide opportunity for new aquaculture, agro-forestry and sustainable harvesting of wetland products. This could result in diversified livelihoods. Planting refugia around blue spaces can provide homes for plant pest predators.

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### 5.2.3 Environmental, economic and social assessment

**The preparation and establishment of the blue-green space aligns with a Category C classification under the GCF's environmental and social risk category definitions.** The project involves a nature-based approach to establishing the blue-green space. This means it is 'low-impact development' or 'green infrastructure'. The purpose of the blue-green space is to provide environmental, economic and social benefits<sup>41</sup>. This includes as a flood control measure and to reduce loss and damage from the increasingly frequent floods. In addition, co-benefits to the local communities will include additional ecosystem services, such as habitat creation, water filtration and groundwater recharge.

**There are important environmental, economic and social considerations that will be incorporated into both the preparation and establishment of the blue green spaces.**

The ESAP for the project has carefully identified and evaluated any such risks for the project as a whole, and outlined concrete mitigation measures. For the blue green space specifically, the most important considerations are:

- The blue-green spaces are intended to serve as a temporary water reservoir, storing large amounts of surface water during the rainy season. There is therefore a risk that needs to be managed of local flooding. If the blue-green space design includes a water source from the upper areas that is connected through a nearby drainage channel, local rainfall events in the upper area may affect the water level in the blue-green space, even if no rainfall occurs in that area. Conversely, when the blue-green space exceeds its capacity and water needs to be released, the lower area has the potential to receive water from this blue-green space.
- Wastewater or drainage overflow that enters the blue-green space, in case of upstream settlements/ industry.
- Build up of sediment in the blue-green space and the need for regular removal to ensure water storage capacity, as well as suitable place to dry the removed sediment and ideally re-used (e.g. as manure).
- Changing the land-use status, including any informal use of the land, for example, individuals/ communities may be informally using/ farming on government land as a valuable source of livelihood.

These will be addressed in the preparation and establishment of the blue-green spaces in the following ways.

**Site and design selection criteria.** The final location for the blue-green space and the actual design will be based on in-depth assessment and consultations, and be guided by a set of criteria for prioritizing options:

- Scale of water storage capacity and therefore effectiveness as flood control measure.
- The land is privately owned and the owner (e.g. farmer) is committed to partner with the project to establish the blue-green space. OR, it is government land with no individuals/ communities formally or informally using the land.

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<sup>41</sup> [Water Reuse and Nature-based Solutions | US EPA](#); [Nature-based solutions: From flood defense to addressing water scarcity and climate change risks - ScienceDirect](#); [UN World Water Development Report 2018 - Nature-based Solutions for](#)

- The local community is fully supportive of the location/ design of the blue-green space.
- There are clear environmental, socio-economic and other potential co-benefits to the blue green space.

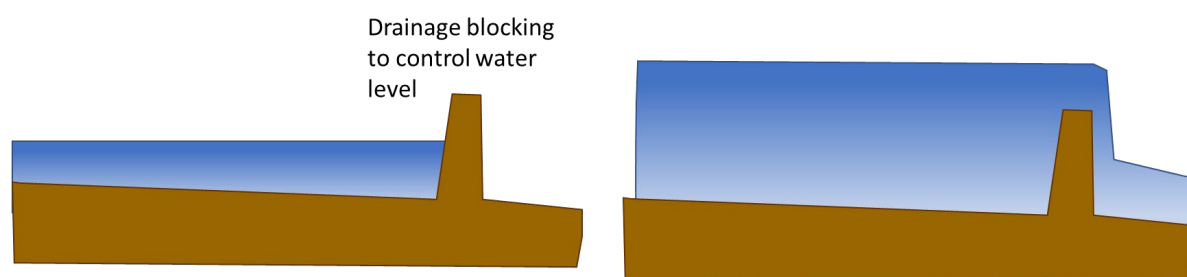
In addition, and equally important, there will be a set of exclusion criteria to ensure that no site/ design is selected that does not meet the project's C classification. This includes a set of criteria for blue-green space sites/designs that will not be selected, including those that:

- Require the construction, maintenance and rehabilitation of associated water infrastructure in the watershed (e.g. dams, hydropower plants).
- Require the acquisition of land and/or resettlement and dispossession of individuals or communities, even if just temporarily.
- Reduce access of individuals/ communities to natural resources that they rely on for their source of livelihoods.
- Require associated facilities/ infrastructure (e.g. access roads, pipelines) to make the blue-green space work effectively (even if this is not funded by the GCF).
- Have a risk of cumulative impacts as a result of the changes in the land, such as disruption of water balance, increase in sedimentation, increase in transport in the village.
- Are located in protected areas and areas of ecological significance, including critical habitats, key biodiversity areas and internationally recognized conservation sites.
- Affect indigenous peoples.

**Consultative process:** Under outcome 1, the design process for blue-green spaces begins by forming a Working Group to guide and approve the preparation process. This will involve city/regency government, village governments, and communities. In addition, community stakeholders will be an integral part of the design process to ensure that the designed socio-economic function of the space is considered. For example, if the community expects the blue-green space to be a family recreation area, sports venue, etc., in that case the landscape design can focus on beauty, family safety, and the provision of sports facilities. If the community expects the blue-green space to provide additional economic benefits, the landscape design can focus on the enabling conditions for economically valuable plants.

**Detailed physical and hydrological assessments.** The design process will involve a water engineer / hydrologist carrying out an in-depth assessment of the hydrological functions of the blue-green space to ensure it is able to effectively store and retain runoff as much as possible, and therefore function as a flood control measure. This will include detail assessment of contour of the land (to determine whether there are natural depressions or hollows in the land, or if these need to be created); the amount and type of water sources as well as its inlets and outlets.

**Risk reduction design features:** Depending on the final location/ design of the blue-green space various specific risk reduction design features can be incorporated. This could include a natural drainage blocking/ water gate at the outlet to control the water level in the blue-green space. See figure below. In addition, if required a control tank can be used. to filter waste or garbage before entering the blue-green space



**Figure 13 Drainage blocking at the outlet to control the water level in the blue-green space**

**Risk monitoring and communications system.** The blue green space design will include a risk monitoring and communication systems and procedures for the blue-green space and its surrounding areas, as well as a flood contingency plan at sub-district level . The monitoring and communication system will include roles and responsibilities for monitoring and reporting of water levels, releasing excess water, and training and socialization of the local community. These details are summarized in the table below.

**Table 8 Key components of the monitoring and communication system**

Key components	Description
Monitoring and reporting water levels in the blue-green space	Monitoring and reporting of water levels in blue-green spaces aims to predict the possibility of overflow when incoming water exceeds capacity. This can impact the surrounding areas, especially the lower areas.
<ul style="list-style-type: none"> <li>a) Time scale of reporting</li> <li>b) Method</li> <li>c) Who announce it</li> <li>d) Who should know it</li> </ul>	
Procedure for releasing water in the blue-green space:	This release procedure is to prevent a sudden rise in water level in the lower area, which may endanger the community who work around the drainage channel as the outlet of the blue-green space.
<ul style="list-style-type: none"> <li>a) Methods</li> <li>b) Procedures</li> <li>c) Who announce it</li> <li>d) Who should know it</li> </ul>	
Regular socialization, trainings and drills on monitoring and communication of blue-green space risks	This training and drill involved the management team, the community around and in the area below the blue-green space.

In addition, each sub-district where the blue-green space is established will be equipped with a flood contingency plan, that is developed in line with National Disaster Management Agency Regulation Number 2 of 2023. This will assess the likelihood and potential impact of flooding in the area, and what activities need to happen to mitigate this risk, as well as actions that will need to take if the hazard does occur.

**Environmental management and monitoring.** An important part of the blue-green space design is the monitoring and evaluation system to ensure the space produces the intended flood reduction, environmental and socio-economic benefits without any unexpected negative impacts. The three key activities involved in effective environmental management of the blue-green spaces are: (1) water resource management, (2) vegetation management and (3) mud management. The table below provides further details on each.

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**Table 9 Summary of key components of environmental management of the blue-green spaces**

Key components	Description
Water management	Water management ensures the effective hydrological function of the space as a temporary water storage facility. It also ensure that the blue-green space's presence does not cause problems in the surrounding area. This includes maintaining and cleaning the inlet and outlet conditions, before and after the rainy season, or as agreed upon.
Vegetation management	Vegetation management ensures the socio-cultural function of blue-green spaces is maintained. The specific activity and schedule depends on the plant type.
Mud management	As a temporary water catchment area, the incoming water that flows into the blue-green space also carries mud from upper area erosion. This mud will settle within the blue-green space. The mud will reduce the water storage capacity of the blue space and reduce the infiltration rate. Therefore, it is required to remove the mud and return it to a non-flooded area before and after the rainy season.

In addition, some key environmental indicators will be routinely monitored at each blue-green space. This includes:

- Water level before, in and after the blue-green space, including inlet and outlet conditions
- The condition of existing vegetation, especially for trees. Vegetation monitoring data can also be used to assess biodiversity and carbon condition.

#### 5.2.4 Economic and financial viability

**There is limited data on the economic and social benefits provided by blue-green spaces intended for flood control.** The studies that are available have primarily been carried out in Europe and other industrialized contexts, and rarely consider and quantify the co-benefits offered by such projects<sup>42</sup>. This project will be an opportunity for this viability and benefits to be monitored, evaluated and reported. Based on the available literature, the primarily and secondary benefits from this project are:

**Avoided flood related loss and damage.** The Climate Risk and Impact Assessment (CRIA, 2021<sup>43</sup>) of 42 flood-prone villages in the Kupang and Sengkarang watersheds estimated annual losses of USD 134.7 million, covering infrastructure repairs, household damage, and losses of agricultural and aquaculture land. Overall, annual damages in the Kupang and Sengkarang watersheds are forecast to reach USD 2.2 billion by 2035, more than twenty times the 2020 baseline.

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<sup>42</sup> [Economic assessment of nature-based solutions to reduce flood risk and enhance co-benefits - ScienceDirect](#)

<sup>43</sup> Mercy Corps Indonesia, 2021. Climate Risk and Impact Assessment of Kupang Watershed and Coastal Area of Pekalongan City and Regency



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It is not possible to accurately quantify how much a single blue-green space (or the four supported by the project) is expected to contribute to the reduction of this flood related economic damage. The economic impact is very context specific, but there are relevant insights from impact studies of nature-based solutions for flood management in other countries. For example:

- Modelling of the potential impact on flood plain restoration in Lewis Creek watershed, located in Vermont, USA: Under all optimal scenarios, the benefits of avoided flood damages over a 100-year time period outweigh the costs of restoration by at least 5-to-1. Floodplain restoration has the potential to reduce the present value of damages by up to \$400,000, a 5% decrease from the baseline, at a cost of only \$75,000. The equity-weighted utility of flood mitigation increase when restoration interventions protect the lowest-income property owners, particularly those who live in mobile homes<sup>44</sup>.
- Modelling in the US on the economic impact of vegetated berms for flood control: The study indicates that berms would eliminate or substantially reduce flow velocities near coastal bridge abutment and low-elevation approach spans by redirecting flood flows away from those vulnerable elements. Even with a relatively low material cost (~\$20,000 not including vegetation), the vegetated berms would reduce the likelihood of bridge span failure during its 50-yr design life from 64% to 39%, by protecting the bridge against the 1% annual chance coastal flood event (current protection level is to the 2% event)<sup>45</sup>.
- Modelling of the economic and biophysical significance of the coastal wetlands in the northern USA: An ecosystem service analysis using the avoided cost method found that wetlands prevented nearly US\$625 million due to flood damages during the Hurricane Sandy event (16% reduction in annual flood losses)<sup>46</sup>.
- Economic impact modelling of floodplain restoration in Lewis Creek watershed, Vermont: Combining hydrodynamic flood simulations with an economic flood damage cost model, 199 possible floodplain restoration locations were identified as cost-effective measures for flood risk reduction in Lewis Creek watershed, Vermont, USA. The model indicated that the floodplain restoration could reduce the present monetary damages by up to US\$400,000 at the cost of only US\$75,000. Additionally, the monetary benefits outnumbered the costs by at least 5 to 1 under the maximum rainfall event over 100 years, which is considered as a useful lifetime of an NBS<sup>47</sup>.

**Environmental and socio-economic co-benefits:** The blue-green spaces are expected to provide a wide variety of co-benefits, although the specific benefits will depend on the final selection of site and design. This could include benefits for local revenue generation, social cohesion, health and mental wellbeing and biodiversity. It is very difficult to put a monetary value on such benefits. However, some interesting studies that have attempted this for nature-based projects in other locations include:

- In the Tamnava basin in Serbia, where significant flooding occurred in 2014 and 2020, the co-benefits of nature based solutions have been assessed and integrated into economic assessments. The results show that when considering flood risk reduction alone, all considered measures have higher costs than the benefits derived from avoiding flood damage. However, when incorporating co-benefits, several nature based

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<sup>44</sup> [Gourevitch: Spatial targeting of floodplain restoration... - Google Scholar](#)

<sup>45</sup> [Webb: Henderson Point Connector \(US HWY 90\): green... - Google Scholar](#)

<sup>46</sup> [Narayan: The value of coastal wetlands for flood... - Google Scholar](#)

<sup>47</sup> [Gourevitch: Spatial targeting of floodplain restoration... - Google Scholar](#)



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solutions have a net positive economic impact, including afforestation/reforestation and retention ponds with cost-benefit ratios of 3.5 and 5.6 respectively. This suggests that incorporating co-benefits into economic assessments can significantly increase the overall economic efficiency and viability of NBS<sup>48</sup>.

- A study by IFAD<sup>49</sup> highlights how NbS benefit rural communities by enhancing food security, productivity, and resource resilience, as well as supporting supporting livelihoods, crop diversification, and inclusion of marginalized groups. Ecosystem services like carbon sequestration, water purification, biodiversity, and recreation/education add significant value. For example, restored wetlands may sequester 0.48–3.76 ton CO<sub>2</sub>e/ha/year, with societal cost value ranging €6–€222/to

**The costs associated with the blue-green spaces include the upfront costs for the preparation and establishment of the space (which will be covered by this project) and maintenance and operation costs.** The upfront costs are limited given it is only a green infrastructure intervention and most of the costs relate to the preparation process, community engagement, hydrological studies, environmental and social risk assessments and labour costs. Ongoing costs are similarly limited, to light maintenance such as cleaning ditches and removing siltation, and will be incorporated in local government budgets.

### 5.2.5 Exit strategy and sustainability

**The sustainability and exit-strategy for the blue-green spaces is integrated within the project activities for the preparation and establishment of the space.** In particular, by establishing a robust and permanent management structure responsible for maintaining the blue-green space beyond the lifetime of the project.

A blue-green space management team will be formed during project implementation, consisting of members of the stakeholders who designed the space and those who have the authority and capacity to manage blue-green space, such as representatives from the environmental office (DLH), public works (PU), other relevant local agencies, sub-districts, villages/kelurahan etc. The first task of this group is to prepare a management, monitoring, and evaluation guide that they will use in carrying out their duties. The management guideline must include blue-green space action plan and operational budget, as well as accommodate and integrate with the previously established contingency plans.

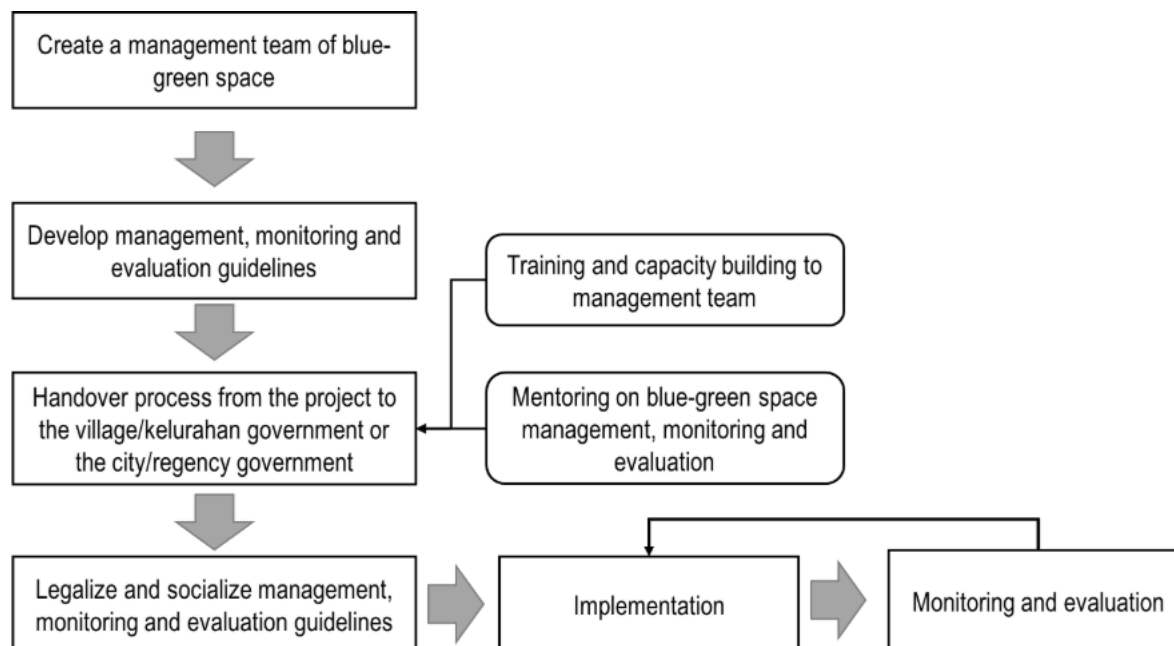
This guide must be agreed upon by the involved parties (such as representatives of regency/city, sub-district, village and impacted villages), legalized by the relevant authorities, and disseminated to the public. Once all guidelines, action plans and operational budgets are in place, the project can hand over the blue-green space to the management team. Next, management, monitoring and evaluation activities are inseparable in order to achieve the objectives of the blue-green space establishment.

The project's approach to the management and sustainability of the blue-green space is illustrated in the figure below.

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<sup>48</sup> [Economic assessment of nature-based solutions to reduce flood risk and enhance co-benefits - PubMed](#)

<sup>49</sup> [Economic benefits of nature-based solutions in relation to sea level rise, storm surges and extreme rain](#)



**Figure 14 Stages of management, monitoring and evaluation of blue-green space**

The blue-green space handover process includes training and capacity building of the management team covering hydrological and physical management, landscape (and vegetation) management, socio-economic component management (such as public activities, economic activities, etc.), safety and emergency situations, and technical monitoring and evaluation. After the formal handover, mentoring the team will help address various issues that arise when managing blue-green space, especially unexpected issues. The mentoring period can be reduced as the management team develops their decision-making and problem-solving skills while carrying out their duties.

### 5.3 Agro fishery

The project will directly result in more resilient communities and ecosystem through adopting climate-resilient livelihoods (outcome 2) and establishment of climate-resilient business models for commodities (outcome 3). The project output and activities related to this component include:

**Output 2.1 Climate-smart agriculture implemented in upstream and midstream villages:** This includes conducting climate-smart field schools for agriculture, establish climate-smart agriculture demonstration plots, expand and contextualize the Climate Information System (CIS) for coffee and carrots, strengthening the capacity of farmer groups, developing participatory conservation plans in upstream and mid-stream areas, implementation of conservation measures.

**Output 2.2 Adaptive aquaculture is implemented by aquaculture farmer groups:** This includes conducting climate-smart field school for aquaculture, which include training of adaptive aquaculture practices (floating nets, shifting ponds inland, silvo-fishery, added value scheme) for grouper and milkfish, establishing adaptive aquaculture demo plots, strengthening the capacity of fishfarmer groups, expanding and contextualizing CIS for

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grouper and milkfish, improving feeding management (ingredients, frequency, efficiency), introducing value-added schemes for aquaculture products (women's groups focus).

**Output 3.3 Climate-resilient livelihood business models operationalized:** This includes the development of bundled service business model for selected aquaculture and agriculture commodities (grouper, milkfish, coffee and carrot), engaging groups (farmers, farmer groups, MSMEs along the VC) linking farmers, financial actors, and technical service providers to foster adoption of business model, improving access and network with offtakers, input providers and financial actors.

**Output 3.4 Inclusive, climate-resilient market systems established:** This includes facilitating linkages with financial institutions (banks, microfinance, insurance), provision of technical advisory services, documenting and disseminate lessons learned, conducting regular monitoring and evaluation.

The project expects to support 400 farmers in accessing financial products and advisory services.

This section provides an overview of the agro-fishery initiatives proposed by the project, outlining the climate rationale, existing production scenarios and challenges for 4 commodities.

### **5.3.1 Background information on closed-loop model of climate-smart agriculture and adaptive aquaculture**

#### **The closed-loop system as a strategic intervention**

The BRAVE project introduces the closed-loop model of agriculture and aquaculture to ensure fostered partnerships between market actors to create a sustainable and integrated agricultural system. Core to this model is the introduction of climate-smart agriculture and adaptive aquaculture practices that assist the farmers and fish farmers to adapt with the changing climate and its impacts. Ultimately, these practices aim to equip the community with a resilient livelihood that enhance productivity and increase local income from the agricultural and aquaculture sector. Risk-informed decision-making process in agriculture and aquaculture will also be fostered through the application of the climate information system.

The project's implementation of this model represents a direct, strategic action to build a positive business ecosystem that can create a stronger, more resilient impact for the Petanglong economy and community. As an inclusive closed-loop model, it represents a multi-stakeholder collaboration between the government, the private sector, financial institutions, and other actors to holistically empower smallholder farmers.

There are six main roles for actors within a functioning closed loop system :

1. **Coordination and facilitation of network of actors:** Focusing on building partnerships and strengthening institutional aspects like farmer cooperatives, community-based business entity and policy frameworks.
2. **Advisory service:** Providing technical guidance to farmers on Good Agriculture Practices (GAP), Good Aquaculture Practices and climate-smart methods.
3. **Market provider:** Actors involved in collecting, distributing, and selling products to ensure a clear path from farm/pond to consumer.

4. **Financial services provider:** Offering economically viable financing schemes and risk-sharing mechanisms (e.g., crop insurance) to farmers.
5. **Input provider:** Supplying essential inputs like seeds, fingerlings, feedstock, fertilizers, and pest control, often with embedded advisory services.
6. **Digital tools provider:** Introducing technology such as weather sensors, soil sensors, and crop monitoring tools to help farmers with real-time decision-making.

This multi-stakeholder setup can then allow the project to address environmental, economic, and social challenges through its specific design and activities:

**Table 10 Closed-loop climate-smart agriculture and adaptive aquaculture system**

Challenge in Petanglong	Closed-Loop Agriculture System as a Solution
<b>Environmental</b>	
<b>Land degradation, increased runoff, and ecosystem stress from unsustainable agriculture; permanent inundation.</b>	The climate-smart agriculture practise improves soil health and water retention through the recycling of nutrients and organic matter. The adaptive aquaculture assist fishfarmers to adapt with the changes in water level.
<b>Economic</b>	
<b>Low productivity, high input and operational costs, and unstable income from flood-related losses.</b>	The practise reduces the need for expensive synthetic inputs while improving yields and creating a more stable market. The practice also promotes improved feeding management and encourages the use of locally sourced fingerlings, which can help reduce operational costs. Additionally, the use of floating nets minimizes the need for maintenance
<b>Social</b>	
<b>Financial vulnerability and dependence on middlemen for capital, leading to low adaptive capacity.</b>	The closed-loop system provides financial access and security, empowering farmers/fishfarmers to manage their own business and invest in resilience.

The following diagram illustrates the interconnected roles and relationships expected within the BRAVE project's closed-loop agriculture system:



**Figure 15 Roles and relationships between actors in the closed-loop system**

### **Adaptive aquaculture as a viable solution**

**The project's intervention in downstream areas focuses on adaptive aquaculture, which is a key measure for addressing the specific climate vulnerabilities of coastal communities.** These communities are highly susceptible to the impacts of climate change, including coastal flooding, sea-level rise, and shifts in salinity and temperature. This recurrent flooding and environmental change have caused significant losses for local fish farmers, many of whom have low adaptive capacity and are forced into less stable forms of labor.

**The BRAVE project's adaptive aquaculture approach addresses these challenges by exploring new commodities and techniques that can thrive in these changing conditions.** The project will pilot adaptive aquaculture methods for species such as milkfish and grouper, which are already commercially viable and can be cultivated in the region.<sup>50</sup> Milkfish, in particular, are extremely adaptable to a wide range of salinities and can be farmed in ponds.<sup>51</sup> The focus will be on improving the productivity and efficiency of existing production areas rather than expanding into new ones. Among the adaptive features include floating nets, feeding management, locally-sourced fingerlings. Similar to the climate-smart agriculture, the adaptive aquaculture intervention will also adopt the closed-loop system, taking into account the specific characteristics of the targeted aquaculture commodities and ensuring the involvement of relevant stakeholders.

### **Provision of bundled services**

**The bundled service provision is a scheme designed to give farmers and fish farmers a comprehensive support package by providing them with a mix of financial products and technical advisory services.** This package includes access to financial products like savings, credits, and insurance from various financial institutions. It offers technical assistance to enhance their capacity in practicing adaptive and resilient agriculture and

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<sup>50</sup> <https://www.panda.org/es/?245358/Farming-more-Farming-better>

<sup>51</sup> <https://www.fao.org/fishery/affris/species-profiles/milkfish/production/en/>

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aquaculture, which in turn improves commodity quality and reduces the risk of harvest failure.

**In the context of escalating climate impacts, such as more frequent flash and coastal floods, the bundled service scheme is a critical component of the project's strategy to build sustained resilience.** Communities in the Petanglong area face significant economic losses and a decline in productivity due to these events, and many farmers and fish farmers lack the financial and technical capacity to adapt. The scheme addresses this by providing a comprehensive package of both financial products and technical advisory services. The technical component provides on-farm assistance to help farmers enhance their capacity in exercising adaptive and resilient practices, which improves commodity quality and reduces the risk of harvest failure. This improved performance has the potential to de-risk the system for financial institutions, making them more willing to provide tailored financial products, such as credits and parametric insurance. By addressing the challenges of financial access and technical know-how simultaneously, the bundled service model allows farmers to reduce reliance on informal middlemen and gain the resources needed to build climate-resilient livelihoods that can continue after the project concludes.

### **Commodity selection rationale for the BRAVE project**

Grouper, carrot, milkfish, and coffee are the four commodities selected for the project based on their climate and local context. These are the primary target commodities. An overview of this is provided in the table below:

**Table 11 Commodity selection**

Commodity	Climate and Local Context
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- |        |  |
|--------|--|
| Carrot | <ul style="list-style-type: none"><li>• Potato is one of the main agriculture commodities in the area, widely cultivated by upstream communities. To accommodate the growing demand for potato farming, land cover changes are rather significant. However, potato is not the sole contributor to agricultural land expansion in the area. Still, identifying alternative crops to reduce reliance on potato is essential, and in MCI's ZCRA program, carrot was selected as the primary commodity for intervention.</li><li>• Carrot is, in fact, already a main crop among upstream farmers. Although it is considered a cool-season crop, carrot has a relatively broad temperature range compared to other vegetables, making them more resilient to slight fluctuations in temperature.</li><li>• In Simego Village, Petungkriyono, carrot production is increasingly affected by the impacts of climate change. Prolonged drought creates severe physiological and biochemical stress in carrot plants. It reduces germination rates, inhibits root growth, and disrupts photosynthesis. As a result, crop yields and quality decline significantly. Research from other carrot-producing regions indicates that while harvests under normal conditions range from 20 to 30 tons per hectare, extreme drought or heavy rainfall can reduce yields to as little as 10 tons per hectare.</li><li>• Beyond yield loss, drought also increases the risk of pest and disease attacks, further threatening farmers' livelihoods. Excessive rainfall, on the other hand, creates waterlogging, root rot, weed overgrowth, and plant diseases. Although carrots demonstrate some</li></ul> |
|--------|--|

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## Coffee

- degree of biomolecular adaptation to extreme conditions, both drought and heavy rain still reduce crop quantity and quality. For farmers in Simego, this means economic uncertainty, as production losses are often followed by fluctuating market prices that can destabilize their income.
- Carrot is also considered as have a tolerance to drought, especially during its early growth stages. Although prolonged drought up until their mid-growth stage can still affect their growth and subsequently the yield.
  - They are also not easily rotten, which allows them to be stored for longer periods after harvest. This is particularly beneficial when transportation to markets is disrupted due to adverse conditions, such as landslides caused by extreme precipitation.
  - Extreme precipitation can lead to soil degradation, particularly due to topsoil erosion, which in turn reduces both the yield and quality of the carrots. Such conditions also create an environment that supports the growth and attack of fungi.
  - An increasingly unpredictable weather also hindered farmers from making timely and appropriate decisions. Many still rely on traditional knowledge to predict the weather; an approach that has become less reliable in the face of climate change.
  - Coffee is an emerging commodity in Jolotigo and a more established one in Silurah. However, farmers in both areas are similarly struggling with the impacts of climate variability on their coffee farming practices.
  - In Jolotigo Village, Talun, robusta coffee farmers are facing multiple threats linked to climate change. Heavy rainfall is one of the most critical challenges. When annual rainfall exceeds 2,600 millimeters, it disrupts the coffee growth cycle. Rainfall patterns have become unpredictable, and farmers no longer know when the rains will come and for how long; while on the other hand, understanding rainfall pattern is critical for coffee farming.
  - Excess rain causes flowers and young fruits to drop before pollination, while ripe cherries crack, which reduces sweetness and increases acidity. These conditions result in smaller beans, lower quality, and delayed maturation. At the same time, pests and diseases such as leaf rust and the coffee berry borer spread more easily in humid environments. Studies suggest that heavy rainfall can lower yields by up to 500 kilograms per hectare.
  - During rainy season, the spread of root fungi is increasing, flowering process is disrupted (the flowers are shedding), and thus significantly affecting the yield.
  - The rainy season also dampens the post-harvest process. Farmers in the targeted areas rely on natural drying process, which becomes difficult to be appropriately done during prolonged rainfall. Accessibility to the plantations is another major issue during this season, since most coffee farms are located deep in the forest areas with steep terrain, making it difficult for farmers to reach and tend to their crops.
  - Unpredictable weather adds another layer of risk. Shifts between rainy and dry seasons disrupt both the vegetative and generative

phases of coffee, reducing both yield quantity and quality. Drought also poses serious problems, as robusta coffee has relatively shallow roots and is more vulnerable than arabica. Extended dry periods slow seedling growth, cause wilting and leaf yellowing, and in severe cases lead to up to 30 percent tree mortality. Large estates have reported production declines of up to 27 percent, while smallholder farmers often face inconsistent and unstable harvests. Prolonged drought and rising temperatures have also expanded the habitat of the coffee berry borer, which now affects plantations even above 1,000 meters.

- Occasional strong winds occur in Jolotigo, especially at the onset of the rainy season. However, due to the presence of shade trees acting as windbreakers, the damage to coffee plants is generally minimal. Only when shade trees are uprooted and fall on coffee plants do significant losses occur.
  - In sum, robusta coffee production in Jolotigo is highly sensitive to climate extremes-particularly heavy rainfall, prolonged drought, and unpredictable seasonal pattern, which collectively reduce productivity, lower bean quality, and increase vulnerability to pests and diseases.
  - Aside from economic value, coffee farming also plays a vital role in conservation in the area. For the Jolotigo area in particular, they are the catchment area of the water source that supplies the regional water supply system. Maintaining vegetation cover in this area, including using coffee trees, is thus critical for water resource protection.
- Grouper
- Grouper is one of the key fisheries (wild capture) commodities in Petanglong area, and they have been supporting the livelihoods of many fishermen.
  - However, in recent years, climate variability has disrupted marine-based fishing practices. Shifts in wind patterns (during monsoon wind, the condition is considered to be unsafe for fishing) and unpredictable weather conditions have reduced the number of fishing periods (months that are safe for fishing in the open sea) to only six months per year (March-May and September-November).
  - As a result, the fishing activities of the fishermen have become more limited, and their total catches, including grouper, are decreasing. This reduction directly affects their income, which has decreased compared to previous years.
  - Despite this decrease in supply, the market demand for grouper remains high, both in local and -particularly- regional markets. The development of grouper aquaculture then emerged as a potential measure to help meet the market demand.
  - The past piloting had shown that grouper aquaculture is feasible, and the market is there. But then the issue of chemical contamination from neighbouring ponds, uncertainty over market assurance and labour-intensive feed preparation process have dampened the enthusiasm of the fishfarmers in this aquaculture.
  - This is on top of the already complex and persistent issue of coastal flooding in the Pekalongan area, which makes their pond vulnerable to inundation and its subsequent impacts. Introducing a more



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## Milkfish

adaptive and environmentally-friendly grouper aquaculture is important.

- Pekalongan is well known for its milkfish commodity, which has long been their primary aquaculture commodity and a key source of livelihood for many fishfarmers. While some of them might cultivate other types of fish, but milkfish remains their aquaculture focus.
- Milkfish farming in Pekalongan is increasingly at risk due to the combined effects of land subsidence, sea-level rise, and extreme weather. The most visible impact is the permanent inundation of brackish-water ponds (tambak). In many coastal areas such as Jeruksari, Bandengan, Panjang Wetan and Degayu repeated tidal flooding (rob) has overtopped pond dikes and, in some cases, transformed productive ponds into open water. The result has been a dramatic reduction in cultivable land: from nearly 200 hectares of milkfish ponds, only about 12 hectares remain productive today. For farmers, this represents not only a loss of land but also the erosion of long-standing livelihoods.
- Harvest failures are increasingly common. Farmers report mass fish mortality, fish escaping from damaged ponds, and frequent crop losses, with economic impacts running into billions of rupiah. Floods often strike just before harvest, wiping out months of labor and investment in a matter of hours. Smallholder farmers are particularly vulnerable, as many lack resources to rebuild dikes, install pumps, or invest in protective infrastructure.
- Currently, they are using stake nets for aquaculture. During high tides, flood water usually overflows the net boundaries, exceeding the stake net height and causing fish to 'escape' to the surrounding water (they flow with the flood water).
- As a response, fish farmers kept raising the height of their stake nets (in some areas reaching up to 3–4 meters in depth). Still, as flood level continue to rise, these efforts are insufficient. The situation is even more severe for ponds located north of the seawall, where tidal inundation is getting more extreme.
- Farmers with sufficient financial capacity continue to raise their nets, while those with limited capacity are forced to abandon their aquaculture livelihood. Many of them turn to informal or manual labor works, which typically offer low and unstable incomes.
- Another major risk comes from sudden salinity fluctuations. When tidal flooding mixes seawater with river and rainwater, pond salinity drops rapidly, stressing milkfish and reducing survival rates. Conversely, during prolonged dry seasons, high evaporation rates cause hypersaline conditions that can stunt growth and damage natural feed systems such as klekap, the algae on which milkfish depend. These abrupt swings in salinity undermine both juvenile survival in nurseries and growth performance during the grow-out stage.
- Finally, the combination of erosion, soil degradation, and infrastructure damage is making pond systems more expensive to maintain and less productive over time. Repeated inundation weakens dikes and sluice gates, while sedimentation and erosion alter pond hydrology, forcing farmers to spend more on repairs or

abandon their plots altogether. In the absence of adaptive measures, Pekalongan risks losing even the small share of milkfish ponds that are still functional today.

- Another issue is the dependency on non-locally-sourced milkfish fry or fingerlings. Aside from the quality that is not guaranteed, they are also need to be sourced from outside the Petanglong area, increasing the operational costs. During major flood events, the situation worsens as the main transportation corridor is potentially inundated, disrupting both human and logistic (incl. aquaculture input) mobility.

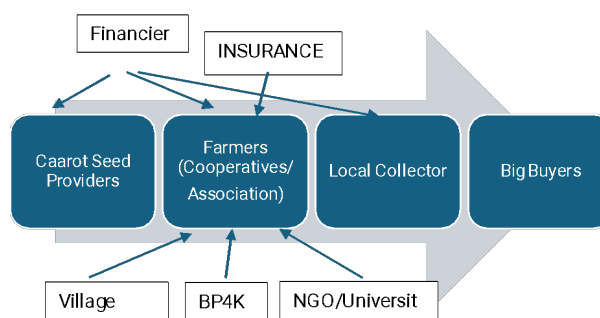
### 5.3.2 Technical assessment

A detailed investigation of each of the commodity's value chain and contextual feasibility was conducted through field visits and literature review. A summary of findings for each of the four commodities is provided below. Additional details can be found in the technical studies for each of these commodities attached.

#### 1. Carrot

**The analysis highlights a significant gap between current practices and optimal techniques:**

- **Current practices:** The current average yield is only 3 tons per hectare. This is largely due to inefficient planting methods, specifically 'seed broadcasting,' where seeds are manually thrown rather than precisely planted in lines. The lack of proper disease control further exacerbates the issue.



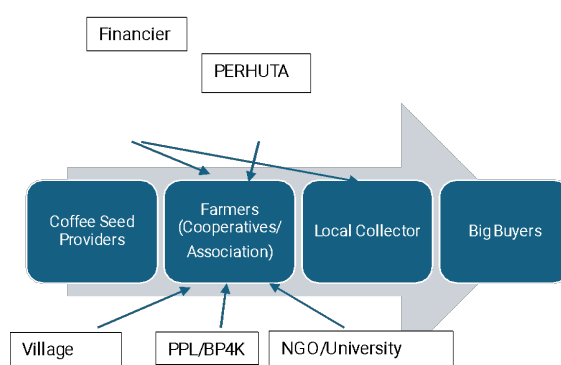
**Figure 16 Carrot farming practices**

- **Challenges and threats:** Farmers face high risks from landslides due to the steep, hilly terrain and high rainfall. Market price volatility is also a major threat, with prices ranging from IDR 600 to IDR 2,500 per kg at the farmgate, compared to IDR 3,500–4,000 for best-practice direct selling. In addition, unanticipated climate variability, particularly in the form of prolonged drought and excessive rainfall, could result in crop failures.

- **Opportunities for improvement:** Benchmarking shows that adopting ‘line planting’ and other GAP practices could increase yields to 5-7 tons per hectare. There is also an opportunity to establish a village-level nursery unit to improve seedling quality and a need for mechanization, such as seed spreaders, to improve planting efficiency.

## 2. Coffee

**The analysis of the coffee value chain suggests strong agricultural culture but a system that is far from its potential.** Farmers in this area have a long tradition of coffee cultivation. However, current practices lack formal Good Agricultural Practices (GAP) and Good Handling Practices (GHP). A critical weakness is the post-harvest process, where farmers manually dry and peel coffee beans, often on the street, which can lead to contamination and poor quality. Further, during the rainy season, the drying process is often incomplete or not done in a consistent manner, further compromising the quality of the beans.

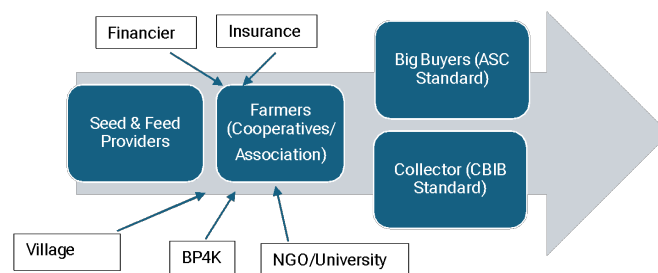


**Figure 17 Coffee farming practices**

**Benchmarking analysis shows that while the current average yield is only 700–1,100 kg/ha, there is a potential for a three-to-five-fold increase to 3,000–5,000 kg/ha if GAP is implemented.** A few champion farmers who have adopted best practices already demonstrate these excellent yields, showing that the potential is real and achievable. The key threats to production include climate change impacts like unpredictable rain, and diseases such as root rot fungus and stem borer insects.

## 3. Grouper

Historically, Grouper fish farmers in the region utilized stake nets ponds, known locally as *jaring tancap*, which were constructed with fine mesh nets tied to bamboo stakes in coastal waters or river estuaries. These ponds, typically measuring 3m by 2m and 2.5m deep, were stocked with 150 seeds purchased from reputable nurseries in Jepara and Situbondo. The cultivation cycle was notably long, spanning 8 to 10 months, to allow the fish to grow to a harvestable size of approximately 1 kilogram. For local market, the harvestable size is approximately 0.25 kg, and thus has a lesser cultivation cycle, which is around 6 months. Feeding was a labor-intensive process, as farmers manually minced natural fish meat for up to five hours daily, a practice that not only consumes significant time and effort but also introduces risks of disease from quickly spoiling feed.



**Figure 18 Grouper farming practices**

### Technical Vulnerabilities and External Threats

The cessation of Grouper farming was a direct result of several critical vulnerabilities that made the venture unsustainable. The most devastating and recurring threat was chemical contamination. Neighboring milkfish farmers frequently used chemicals to eradicate pests, which contaminated the shared seawater and caused mass Grouper mortality, sometimes as high as 50%. This conflict between adjacent aquaculture practices highlights a critical flaw in the enabling environment where Grouper farming is located.

Furthermore, the species' sensitivity to environmental conditions posed a significant risk. Groupers require high salinity, and cold water during the rainy season or excessive river inflow into estuarine ponds would reduce both salinity and temperature, making the fish susceptible to illness and death. The pond infrastructure itself was a source of constant challenge. The stake nets were prone to damage from crabs, pufferfish, and strong winds, necessitating frequent and costly replacements at an expense of IDR 250,000 per replacement. A long-term, climate-induced problem was also observed, with the combination of rising sea levels, land subsidence and extreme tidal flooding causing ponds to deepen from 2 to 4 meters. The situation is even more severe for ponds located north of the seawall, where tidal inundation is getting more extreme. Additionally, during high tides, flood water usually overflows the net boundaries, exceeding the stake net height and causing fish to 'escape' to the surrounding water, increasing the risk of nets sinking and fish escaping.

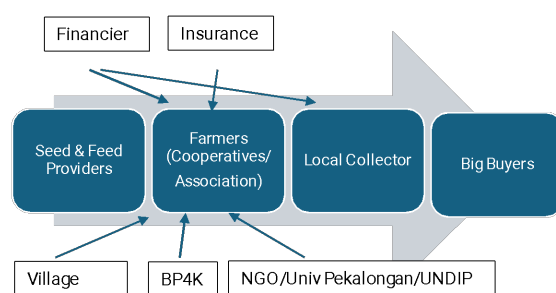
A fundamental observation from the analysis is that the high mortality risk in **Grouper farming is not a technical problem inherent to the farmers' skills, but rather a consequence of a broken and unmanaged enabling environment**. The direct conflict with neighboring Milkfish farmers, whose pest control practices are lethal to groupers, points to an absence of coordinated land and water use management.

### 4. Milkfish

Milkfish farming in the Petanglong area is a well-established livelihood that has been practiced for years, often by former rice farmers who transitioned their lands due to coastal inundation. Despite its longevity, **the sector is plagued by technical inefficiencies and environmental vulnerabilities that limit its profitability and sustainability**.

Milkfish farmers typically operate in stake nets ponds and manage a five-month cultivation cycle. The production is constrained by poor and inconsistent seed quality, with farmers complaining that the huge variation in quality affects the yield and survival rate of the fish. This leads to a low average survival rate of 60-70%. To control pests like unwanted fish and predatory birds, farmers rely on chemical pesticides, a practice that, as the analysis

of Grouper farming shows, creates a direct and lethal externality for other aquaculture activities in shared waters. Manual harvesting techniques also contribute to a loss of value, as nets often damage the fish scales, reducing their market price and appeal.



**Figure 19 Milkfish farming practices**

### Environmental and climate-induced vulnerabilities

The ponds themselves are highly susceptible to climate and environmental degradation. They are vulnerable to tidal floods and strong winds, which can cause nets to collapse and fish to escape. Land subsidence, increasing severity of tidal flooding and sea-level rise are chronic issues that have caused ponds to gradually deepen, necessitating longer bamboo poles and wider nets for maintenance, which adds to the long-term operational costs. The close proximity of some ponds to rivers that receive industrial waste, particularly from the batik industry, introduces another significant source of pollution, posing a direct threat to fish health and the safety of the final product.

The use of chemical pesticides in milkfish farming is a primary driver of inter-community conflict and environmental degradation in the region. The practice, while aimed at protecting the milkfish crop, directly and devastatingly impacts the livelihoods of neighboring grouper farmers and pollutes the shared aquatic ecosystem.

### 5.3.3 Environmental, economic and social assessment

The assessment concluded that project activities pose minimal adverse risks that are small-scale, site-specific, short-term, and readily mitigated. Accordingly, the project has been designated as Category C under the GCF Simplified Approval Process. The screening was carried out by assessing each proposed activity against a set of criteria developed by the project proponent. These criteria were informed by:

- *GCF ESS* (based on IFC Performance Standards):
  - *PS1* – Assessment and Management of Environmental and Social Risks and Impacts
  - *PS2* – Labour and Working Conditions
  - *PS3* – Resource Efficiency and Pollution Prevention
  - *PS4* – Community Health, Safety and Security
  - *PS5* – Land Acquisition and Involuntary Resettlement

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- *PS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources*
  - *PS7 – Indigenous Peoples*
  - *PS8 – Cultural Heritage*
  - *GCF Environmental and Social Policy*
  - *GCF Gender Policy* – emphasizing gender equality, inclusion of vulnerable groups, and gender-sensitive design.
  - *GCF Indigenous Peoples Policy* – focusing on land tenure, cultural identity, and well-being of Indigenous Peoples.

Screening results indicated that project activities may have potential impacts on three Performance Standards (PS):

- *PS1 – Assessment and Management of Environmental and Social Risks and Impacts*
- *PS2 – Labour and Working Conditions*
- *PS3 – Resource Efficiency and Pollution Prevention*

These areas require proportionate mitigation measures, which must be included in the ESAP. For the remaining Performance Standards, no significant negative impacts were identified:

- *PS4 – Community Health, Safety, and Security*  
The project is expected to have positive impacts, including improved public health from reduced flood-related disease risks. Kemitraan and MCI both have robust policies on sexual harassment, exploitation, and abuse, supported by Codes of Ethics and safeguarding frameworks, which will be applied to the project.
- *PS5 – Land Acquisition and Involuntary Resettlement*  
The project will not involve land acquisition or involuntary resettlement. Blue-green infrastructure will be established on government-owned land, and livelihood activities will take place on community or government land with appropriate cooperation agreements to prevent conflict.
- *PS6 – Biodiversity Conservation and Natural Resources Management*  
The project follows a nexus approach, integrating climate resilience, flood management, and adaptive livelihoods to enhance ecosystem services. Activities such as climate-resilient agriculture and aquaculture are designed to improve ecosystem productivity and sustainability, rather than degrade natural resources.
- *PS7 – Indigenous Peoples*  
No Indigenous Peoples were identified in the project area. Local communities in Petanglong maintain social norms and traditional practices (e.g., seasonal planting calendars), which will be respected and integrated into the livelihoods approach.
- *PS8 – Cultural Heritage*  
The project area includes Pekalongan, recognized by UNESCO as a World Creative

City of Batik. However, BRAVE activities will not affect batik-related practices or heritage. As such, no adverse cultural impacts are expected.

The environmental and social screening confirmed that the BRAVE project falls under Category C, with only Performance Standards (PS) 1, 2, and 3 requiring specific mitigation measures. Below is a summary of the risks posed by the project activities.

Output	Summary of risks	Risk
<b>Landscape resilience assessment developed</b>	Results of the assessment may be ineffective or counterproductive due to overlaps or conflicts with ongoing or unplanned government initiatives and/or dynamic environmental changes in the Petanglong coastal area	Low
	Exclusion of women and vulnerable groups in the assessments	Low
	Use of incomplete or outdated data leading to poor design	Low
<b>Climate resilient community groups formed and capacitated</b>	Resistance may arise from upstream local CSOs or the community if they do not recognize the urgency of resilience building. Low understanding or adoption of climate information in planning	Low
	Exclusion of women, vulnerable groups in community groups	Low
	Social conflict might occur due to a feeling of unequal opportunity for involvement in the community groups	Low
<b>Climate-informed Land Use, Water Resource, and Livelihood Action Plans Developed</b>	Inaccurate integration of climate risk projections into land and water plans	Low
	Misalignment of land use and water management plans with community needs	Low
	Exclusion of women and vulnerable groups in participatory planning	Low
	The introduction of the resilient livelihood action plan may disrupt existing social and economic structures, including supply chains and traditional business practices, potentially causing resistance, reduced acceptance, or social tension within the community	Low
<b>Blue-green Space Mapped and Designed</b>	The potential location for blue-green space may currently be used by the community for socio-economic purposes, which could lead to social resistance from current users during design phase	Low
	The blue-green space, design may trigger environmental and social safeguards	Low

Output	Summary of risks	Risk
	Potential minor impact on soil and water quality during mapping and preliminary site work	Low
<b>Climate Smart Agriculture Implemented in Upstream and Midstream Villages</b>	Potential dependency on ecosystem services (water, soil) ecosystem stress	Low
	Use of fertilizers or practices that could affect soil/water quality	Low
	Incorrect implementation of climate-smart practices (poor yield or maladaptation) and guidance	Low
	Exclusion of women, youth, and vulnerable groups from CSA activities. This could lead to poor gender representation and prevent female farmers from obtaining optimum project benefits	Low
	Resistance may occur as climate-smart agriculture introduces different methods and advanced technology, challenging rural communities unexposed to such systems and potentially leading them to resist shifting from conventional local wisdom. Unsatisfied voices on location selection could lead to social conflict	Low
	Water pollution may occur due to sedimentation and nutrient flow to water bodies, resulting from resilient agriculture practices	Low
<b>Adaptive Aquaculture is Implemented by Aquaculture Farmer Groups</b>	Use of feed or practices that could impact water quality	Low
	Dependency on ecosystem services (water, fish stocks)	Low
	Occupational health and safety risks	Low
	Poor adoption of adaptive aquaculture practices	Low
	Exclusion of women, youth, and vulnerable groups from aquaculture activities	Low
<b>Runoff management through Blue-Green Spaces established</b>	Potential conflicts over land use or access with local communities during early stages	Low
	Potential impact on soil and water quality	Low
	Water pollution from sediment transportation during the land preparation phase. Development may also alter sediment flow, runoff patterns and water catchment potential in other areas	
	Exclusion of vulnerable groups from planning and management	Low



Output	Summary of risks	Risk
	Long term maintenance and sustainability risks	Low
	Workers exposed to safety and health risks during blue-green space establishment	Low
<b>Sub District Contingency Plan Established</b>	Inadequate preparedness for flood or extreme weather events	Low
	Lack of community capacity to respond to emergencies	Low
	Coordination gaps among local stakeholders	Low
	Risk of plan not being updated with changing climate and flood patterns	Low
	Contingency plan do not take account of the specific needs and concerns of gender and vulnerable groups	Low
<b>Knowledge Management and Capacity Building System Established</b>	Exclusion of key stakeholders in policy analysis and development	Low
	Risk of recommendations being ignored by decision-makers	Low
	Potential inequity in policy outcomes	Low
<b>Enabling Policy Frameworks Adopted for Climate-Resilient IWRM</b>	Delays in policy adoption and/or missed policy window due to bureaucratic processes	Low
	Inadequate integration of climate resilience and landscape considerations	Low
	Limited uptake by local/provincial authorities	Low
	Risk of inadequate stakeholder participation or communication breakdowns that could hinder project acceptance or success	Low
<b>Climate Resilient Livelihood Business Models Operationalized</b>	Low adoption of business models by farmers and aquaculture groups	Low
	Exclusion of women, youth, or vulnerable groups from business model benefits	Low
	Market or financial risk impacting viability	Low
	Unsustainable practices affecting natural resources and/or other safeguards triggered from company operations	Low
	Knowledge gaps hindering replication and scaling	Low

Output	Summary of risks	Risk
<b>Inclusive, Climate Resilient Market Systems Established</b>	Limited access to finance and insurance for smallholder farmers or fish farmers	Low
	Inability to develop or operationalize financial products in partnership with banks	Low
	Market instability, including potential conflict from market disruption and the presence of new market actors in the current market networks, affecting adoption and sustainability	Low
	Exclusion of vulnerable groups (women, youth, marginalized farmers) from market access	Low
	Resistance in using new financial products due to unfamiliarity with the schemes	Low
	Local FIs financing nature-positive business cases may inadvertently fund companies or projects that fail to properly balance nature-positive approaches with sustainable practices	Low
<b>Sexual Exploitation, Abuse and Harassment</b>	Risk of Sexual Exploitation, Abuse, and Harassment (SEAH) during community consultations, trainings, field activities, and interactions between project staff, contractors, and community members, particularly affecting women, youth, and vulnerable groups.	Low

Detailed information on the environmental and social impacts assessment and plan can be found in Annex 12 Environmental and Social Action Plan.

### 5.3.4 Financing options

The proposed financial structure blends concessional public finance (grants) with confirmed co-financing totalling USD 700,391, representing 7.23% of the total project budget, with contributions from the Executing Entity support fund (USD 178,625) and local government annual budget allocations (USD 521,766).

The grant-based approach reflects the nature of interventions, climate-resilient infrastructure, ecosystem restoration, and community-based adaptation, and the limited fiscal space in the Kupang and Sengkarang watersheds. Under Indonesia's PBI policy, Central Java is expected to experience the highest climate-related GDP losses in the coastal subsector and third highest in agriculture, while municipal budgets remain relatively stagnant (MCI, 2023).

This public finance base is designed to unlock additional private investment. While commercial commitments are still in structuring and excluded from confirmed co-finance, there is strong interest from private companies and financial institutions to participate

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through equity and loans. GCF funding will help de-risk early adoption, demonstrate technical and economic viability, and create investable models for climate-resilient and biodiversity-positive livelihoods.

Grants are preferred over debt or equity because the measures do not generate predictable revenue streams. The main benefits, reduced flood damages, improved water security, and ecosystem services, are shared public goods. Over time, proven adaptation models are expected to attract bank financing and private investment, especially for climate-smart agriculture and aquaculture.

The terms and tenor of GCF support are aligned with the time needed for ecosystems to recover and community adaptive capacity to strengthen. Public finance is therefore essential to absorb early-stage risks, enable enabling-market conditions, and lay the foundation for long-term private sector engagement.

The proposed instrument, a concessional grant, addresses the absence of viable commercial financing for climate-resilient watershed management, climate-smart agriculture, adaptive aquaculture, and blue–green infrastructure in the Kupang and Sengkarang watersheds. These activities deliver significant public goods, including reduced flood risk, improved food and water security, biodiversity protection, and enhanced climate resilience, but do not generate direct cash flows that would appeal to private investors.

### 5.3.5 Economic and financial viability

#### 1. Carrot

The economic feasibility analysis of carrot farming suggests a volatile business with a seemingly healthy profit margin that is undermined by high risks and low bargaining power.

- **Cost-Revenue Dynamics:** Based on a best-case scenario conducted during the analysis, a farmer can achieve a net profit of IDR 2.98 million per hectare per cycle, with a profit margin of 44%. However, this is highly susceptible to the extreme fluctuations in selling price, which can be as low as IDR 600 per kg, well below the break-even point.
- **Cost-Benefit Ratio:** The Benefit-Cost (BC) Ratio is calculated at 1.66, which is above 1 and indicates that the business is viable. However, this metric can be misleading without considering the high price volatility and climate risks.
- **Systemic Issues:** The core economic challenge is the lack of institutional support, particularly the absence of farmer groups or cooperatives for carrot farmers. This forces farmers to sell in bulk at the farmgate to collectors, who have significant influence in setting prices. This leaves farmers vulnerable to price manipulation and without the collective power to negotiate better terms or invest in shared resources. The lack of financial literacy and a formal system for recording transactions also hinders their ability to manage costs and evaluate profitability accurately.

#### 2. Coffee

The economic feasibility of coffee farming is characterized by an imbalanced value chain that heavily favors downstream actors.

- **Cost-Revenue Dynamics:** The total cost per kilogram for farmers is estimated at IDR 2,000, which includes labor and other inputs. They sell their wet coffee for IDR 11,000 per kg, yielding a profit margin of approximately 18%. This is the lowest margin in the entire value chain. In comparison, collectors and roasters who also function as collectors enjoy margins of 20% and up to 100%, respectively. This situation is exacerbated by low quality of the produced coffee due to farmers' limited access to information on good agricultural practices, lack of grading, and climate conditions including unpredictable weather, high humidity and sporadic rainfall.
- **Cost-Benefit and Productivity:** The Benefit-Cost Ratio (BCR) for farmers is 5.5, which technically indicates that the business is viable. However, this high number masks the low profit per unit. The average farmer income is a modest IDR 50-60 million per hectare, which is not substantial enough to be considered a thriving business. The break-even point for a farmer is only 185 kg, but with the high costs, the actual income is still low.
- **Systemic Issues:** A key economic weakness is the farmers' dependence on local collectors who also act as informal credit providers. This creates a one-way/ monopolistic relationship where collectors have the power to set non-transparent prices and trap farmers in debt. The lack of active farmer cooperatives prevents farmers from engaging in collective bargaining for better prices or pooling resources for shared infrastructure like a drying house.

### 3. Grouper

The economic feasibility of Grouper farming is characterized by its high-value nature that is paradoxically undermined by its high operational costs and significant financial risks.

- **Cost-Revenue Dynamics:** The financial model for Grouper farmers was marked by high initial capital outlay. Each seed cost IDR 6,000, and a basic pond setup required an investment of approximately IDR 4,000,000 for netting. On an operational level, feed was the largest expense, requiring substantial quantities of natural fish meat that cost between IDR 2,000 and IDR 2,500 per kilogram. The overall financial picture was one of tight, and often negative, margins. A profit margin of 25-33% was estimated under 'normal' conditions in 2018; however, this theoretical profitability was rarely achieved in practice. A case study of a farmer who experienced 50% mortality due to chemical contamination resulted in a significant net loss of over IDR 7.5 million, illustrating the extreme financial risks involved. A more optimistic, but still precarious, scenario for a farmer with 2,000 seeds showed a profit of only IDR 1.365 million over an 8-10 month cycle, translating to a benefit-cost-ratio of just 1.03. This thin margin provides little to no buffer against unforeseen circumstances or economic shocks, which are frequent in a climate-vulnerable sector. The primary market disincentive was a significant drop in the selling price, from IDR 80,000-90,000 per kilogram in 2018 to a current range of IDR 50,000-60,000, further squeezing already thin margins.
- **Break-even point and productivity:** The break-even point analysis for Grouper farming confirms its marginal viability. Using the costs from the more successful farmer example (Farmer B), it was calculated that approximately 825 kg of grouper fish needed to be harvested to cover all costs. Since this farmer's actual harvest was 850 kg, the profit was indeed minimal, at just IDR 1,365,000. The fact that the most successful case barely exceeds the break-even point underscores the high-risk nature of the business and explains why farmers have abandoned it.

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A critical conclusion from this analysis is that the high market value of Grouper does not translate into high profitability for farmers. While the commodity commands a premium price, this value is absorbed by systemic risks, such as high mortality, price instability, and theft before it can be realized by the producers. The fragility of the value chain means that the farmer, as the most vulnerable actor, bears all the risk and captures almost none of the potential profit, making it a rational decision to cease cultivation in the current unmanaged environment.

#### 4. Milkfish

The economic feasibility of milkfish farming is defined by its marginal returns, high dependence on external financing, and a value chain structure that concentrates profits away from the primary producers.

**Cost-Revenue Dynamics:** Milkfish farming is a capital-intensive venture on a small scale, with farmers needing between IDR 10 million and IDR 15 million in working capital per cycle. A detailed breakdown of costs for an average 0.3-hectare pond shows total expenses of approximately IDR 19.073 million per five-month cycle, with a large portion going to various types of feed. With an average harvest of 1 ton per cycle and a selling price of IDR 20,000 per kg, the average revenue is IDR 20 million. This leaves a net profit of just IDR 927,000 over a five-month period, an exceptionally low figure that highlights the severe financial pressure on farmers. The Return-Cost ratio of 1.048 further confirms this, indicating that for every IDR 1.00 invested, the farmer receives a return of only IDR 1.048. Additionally, the fishfarmers also incur extra maintenance costs to regularly raise the height of the stake nets to accommodate rising water levels, as well as to repair the bamboo and nets.

**Market structure:** This low profitability is the direct cause of a critical systemic issue: farmers' reliance on village-level collectors and middlemen for working capital. These collectors provide informal loans, which creates a debt-based relationship that obligates farmers to sell their harvest back to the lender, often at a predetermined, and likely lower, price. This power dynamic ensures that the middlemen capture a significant portion of the value and profit, while farmers are left with thin margins and limited bargaining power. In contrast, processors of value-added products like 'presto' milkfish capture a much larger profit margin, demonstrating the economic potential that farmers are unable to access due to capital and knowledge constraints.

The central issue is that the value generated in the milkfish value chain is systematically captured by intermediaries, rather than the farmers who bear the production risks. This dynamic perpetuates a cycle of financial precarity, preventing farmers from accumulating the capital needed to invest in better infrastructure, higher-quality inputs, or value-added processing. BRAVE project is therefore rightly focused on developing a closed-loop system and bundled services to break this cycle of dependency by providing farmers with direct access to finance and markets, as well as the technical support needed to enhance their productivity and profitability. Additionally, under BRAVE project, a more adaptive method will be introduced to contribute in reducing maintenance cost.

##### 5.3.6 Exit strategy and sustainability

The strategic prioritization of commodities, along with an understanding of their specific challenges and opportunities, ensures that interventions are precisely targeted for maximum impact. The project's central business models—the closed-loop ecosystem and the bundled service scheme—provide a market-driven mechanism for creating financial independence and

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reducing long-standing vulnerabilities to middlemen and climate shocks. By embedding these models within local governance and policy frameworks, the project creates a legal and institutional basis for continued implementation and replication.

For its livelihood intervention, BRAVE adopts a Market Systems Development approach that ensures that resilient livelihoods are financially sustainable and market-driven rather than donor-dependent. The project supports closed-loop agriculture and resilient aquaculture systems that link producers to off-takers, processors, and financial institutions. These systems reduce production risks by providing access to climate information, quality inputs, and technical advice and strengthen market access through value chain agreements and guaranteed off-take arrangements. The project also enhances financial inclusion by co-developing bundled service packages with banks, microfinance institutions, and insurers, with financial products to be explored including but not limited to microfinance, credit, savings, and risk transfer products. The project's strategy for private sector engagement involves:

- **Closed-Loop Systems:** The closed-loop livelihood model is inherently attractive to the private sector because it provides a predictable supply of high-quality, climate-resilient commodities. Actors such as seed providers, feed suppliers, and off-takers can see a clear business case for their involvement.
- **Bundled Services:** By co-developing bundled service packages that include financial products and technical advisory, the project de-risks investment for financial institutions and ensures a higher-quality product stream for off-takers.
- **Formalization:** The project is targeting to secure expressions of interest from four organizations (offtakers, input providers and financial institutions), with commitments to be formalized through MoUs. This provides a strong foundation for future replication and scaling without concessional finance.

By demonstrating profitable, resilient, and inclusive business models, BRAVE will crowd in private investment during and after project implementation. A strong business model could attract private companies and financial institutions to be involved in the system, fostering replication and scale-up in the long term. Once resilient value chains are proven viable and profitable, champion companies are expected to replicate and scale these models independently in other locations, reducing reliance on concessional finance.

**Table 12 Commodity selection analysis**

Commodity	Strengths	Opportunities leveraged through BRAVE	Key Metrics						Potential Actors			
			Profit	Profit Margin	Risks	Production Cycle	Maturity	Benefit-cost ratio	Core function	Supporting function	Enabling environment	Other
Carrot	- Ideal highland agro-climate for cultivation - Farmers have community knowledge on specific carrot types and prior exposure to good agricultural practices (GAP) - Existing plant rotation practices help maintain soil health and manage pests	- Potential to expand into niche markets - Creation of a closed-loop seedling or nursery system - Opportunities for mechanization and collective marketing through farmer groups - Direct access to big buyers through contract farming	IDR 2.98 million per hectare per cycle	44%	Market price volatility, landslides, diseases from high rainfall, extreme drought, dependence on middlemen	3-4 months	Bulk sales at farmgate, highly dependent on collectors	1.66	Farmers, collectors, big buyers (UD Dieng)	Seed providers (PT Petung Bumi Makmur, CV Agung Sejahtera), financial institutions (BRI Link, BPR BKK, PT PNM, ACA, Zurich Sharia)	Village and Regency Government	NGOs (MCI), BUMDES (Village-owned Enterprise)
Coffee	- Suitable agro-climate - Long tradition of cultivation and an existing "agri-	- Strong potential for specialty coffee branding and agro-tourism - Market access via	IDR 50-60 million per hectare (yearly)	18%	Climate change (unpredictable rain), root rot fungus, stem borer insect, non-transparent	Yearly	Limited, dominated by collectors and roasters, short supply chain	5.5	Farmers, collectors, off-takers, small-scale roasters (e.g., Coffee and Beyond)	Seed providers (CV Sumber Agung, CV Agung Sejahtera, Sentra Bibit Kopi),	Perhutani (landowner), Village and Regency Government	

	culture" - Potential for significant yield increase (3-5x) with improved practices	e-commerce - Potential for a three-fold yield increase by applying Good Agricultural Practices (GAP) and Good Handling Practices (GHP)			and volatile prices, most of the coffee plantation area is owned by SOE (Perhutani), rigid profit-sharing with landowners					financial institutions (BRI, PT PNM, Bank Mandiri, BPD Jateng, Allianz, ACA, Zurich Sharia)		
Grouper	- High market value, fetching IDR 50,000–90,000 per kg - Existing farmer experience and basic infrastructure - Quality seeds are accessible from nurseries in Jepara and Situbondo	- Potential for export markets - Use of demonstration plots to showcase controlled, eco-friendly practices - Adoption of more durable and climate-resilient Floating Net Systems (FNS) - Creating a closed-loop system with village facilitation	IDR 1,365,000 (over 8-10 months)	25-33% (estimated)	Chemical contamination from neighboring milkfish ponds (major threat), theft, low water salinity, fluctuating market prices [1, 1] Production Cycle: 8-10 months	-	Nascent, no specialized collectors exist	1.03	Former farmers, collectors/traders, buyers with ASC standards (PT Tilapia Nusantara Jaya), restaurants, exporters :	Seed suppliers (Jepara, Situbondo), feed providers (Unggul Jasa, Jaya Perkasa), financial institutions (BRI, BTPN, PT PNM, Bank Mandiri, BPD Jateng, Allianz, ACA, Zurich Sharia)	Village and Fisheries Dept (local government), NGOs/University (Pekalongan, UNDIP) [1, 1] Other: Adjacent milkfish farmers (act as a threat)	Local Department of Agriculture (PPL/BP4K)
Milkfish	- Experienced farmers, many being former rice farmers - Established local market with access to	- Strong market for value-added products like presto milkfish [1, 1] - Potential to increase	IDR 927,000 (over 5 months)	25% (estimated)	Poor and inconsistent seed quality, high input costs, dependence on middlemen for capital, chemical	5 months	Established local market, but farmers have low bargaining power	1.048	Farmers, village-level collectors/middlemen, Presto milkfish businesses/processors, modern retailers	Seed suppliers (BBPBAP Jepara, PT Moya Bahari Perdana), feed providers (Unggul	Environment: Village Government, Fisheries Department	NGOs/University (Pekalongan, UNDIP)



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practices  
could  
improve  
product  
quality and  
health

pesticides,  
tidal floods,  
industrial  
waste  
pollution

(Hypermart,  
Transmart,  
Yogya Mall)

Jasa, Jaya  
Perkasa),  
financial  
institutions  
(BRI,  
BTPN, PT  
PNM, Bank  
Mandiri,  
BPD Jateng

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## 5.4 Gender Assessment

The project will incorporate a comprehensive gender-sensitive approach to address the unique vulnerabilities and barriers faced by men and women in the Petanglong area. The analysis, which draws on a review of national policies, socioeconomic data, and direct consultations with community members, identifies key challenges and outlines a strategic framework for intervention.

The gender analysis suggests that women, children, people with disabilities, and the elderly are disproportionately vulnerable to climate impacts, such as floods. Women are 14 times more likely to die in a disaster and account for 80% of individuals displaced by climate change, largely due to their primary caregiving responsibilities. Recurrent flooding has also led to higher instances of domestic violence and sexual abuse.

Socioeconomically, women face significant barriers to participation. Despite legal entitlements to land ownership, they often possess less actual land, which limits their access to credit since land certificates are typically used as collateral for loans. The female labor force participation rate is low and stagnant, a trend attributed to structural barriers like occupational segregation and the heavy burden of unpaid care work. Female-headed households, which make up approximately 14% of families in Pekalongan Regency, are particularly vulnerable and financially insecure.

In terms of roles, men are typically dominant in decision-making related to land selection and production inputs in agriculture and fisheries. Within the upstream farmer communities, all farmers appear to have a similar role in the agricultural activities regardless of gender. However their active involvement often hindered by time constraint, accessibility and household duties. Generally, women play a crucial role in post-harvest activities, processing commodities for sale, and managing household finances.

### Gender Incorporation into the Project

The project is designed to integrate gender considerations across all three of its main outcomes to ensure equitable benefits and participation.

#### Outcome 1: Climate-Informed Planning and Design

Before the project begins, a comprehensive gender and social inclusion needs assessment will be conducted to identify the specific needs, capacities, and barriers of diverse groups, including women, female-headed households, and people with disabilities (PWDs). All data collection and analysis throughout the project will be gender-disaggregated to inform a nuanced understanding of vulnerability, including data on land ownership, decision-making roles, and access to resources.

The project will ensure equitable representation of women, female farmers, female-headed households, and PWD in all participatory planning processes for land use and water resource management, and also livelihood action plan. These planning sessions will set explicit targets for female participation and may provide support, such as childcare or transportation, to overcome domestic burdens and time constraints. Project staff will receive gender-sensitive training to ensure they can identify gender-specific impacts of climate change and apply a gender-sensitive approach in their work.

#### Outcome 2: Resilient Community and Ecosystem

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This outcome focuses on translating plans into action through a gender-sensitive approach.

- **Climate-Resilient Livelihoods:** The project will design gender-sensitive and practical training programs for climate-smart agriculture and adaptive aquaculture. The training will leverage women's existing roles in post-harvest processing and value-added schemes, such as the processing of milkfish and tilapia, to provide income-generating opportunities. The project will also facilitate women's access to credit and financial services without the need for traditional collateral by leveraging microfinance programs specifically designed for women, such as PNM Mekong.
- **Runoff Management :** The design and establishment of blue-green spaces, its monitoring and communication procedure, and flood contingency plans will be fully inclusive, with women and PWDs actively participating in the planning and validation. Blue-green spaces will incorporate safety features like adequate lighting and accessible pathways to prevent gender-based violence, a problem reportedly higher in flood-affected areas. The monitoring and communication procedure, and also flood contingency plan will be disseminated in multiple, accessible formats , to ensure PWDs can receive timely and understandable warnings. Women and PWDs will also be integrated into disaster preparedness and evacuation simulations (emergency drills).

### **Outcome 3: Enabling Environment for Replication and Scale-Up**

For long-term sustainability, the project will work to institutionalize gender-responsive practices. Multi-level stakeholder engagement, including policy dialogue, will involve actors working in gender context, to ensure the perspectives of women's organizations, PWD advocacy groups, female community leaders or other relevant organizations are systematically captured. The project will advocate for policy recommendations that strengthen institutional capacity for gender mainstreaming, particularly at the sub-national level, by promoting the consistent use of gender-disaggregated data and dedicated budgets for gender initiatives.

Furthermore, the project will design livelihood business models that specifically address the economic vulnerabilities of women, female-headed households, and PWDs. These models will provide comprehensive support, combining initial capital, technical assistance, and market access. By demonstrating the viability of these models, the project aims to create a financially self-sufficient ecosystem that is not dependent on grant funding after the project concludes.

A detailed gender assessment and gender action plan can be found in Annex 4 of the Funding Proposal .

## **5.5 Summary of alignment with ESS category**

Environmental and Social Safeguard (ESS) screening of the proposed project was undertaken and an Environmental and Social Impact Assessment and Management Plan (ESAP) has been developed (Annex 12 of the Funding Proposal). Potential environmental and social impact of planned interventions was assessed on three different risk scales (A, B & C) based on their severity and reversible status. As per standard practice, ESS screening has been carried out at the pre-mitigation stage to enable the most serious potential impacts of the activities to be considered.

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This ESS assessment and ESAP preparation work is guided by Kemitraan's Environmental and Social Protection Policy, which provides the framework, including guiding principles, for Kemitraan to ethically and sustainably manage social and environmental risks and impacts of all its activities. This will be done in an inclusive manner, so as to maximise whole-of-society benefits. The intent of this policy is to promote:

- **Environmental Sustainability:** Reduce ecological footprint through sustainable practices and promoting the conservation of natural resources.
- **Social Responsibility:** Ensure activities contribute to the well-being of communities and respect human rights.
- **Ethical Governance:** Uphold principles of good corporate governance in all our operations, ensuring transparency, accountability, and ethical behaviour.

**Disclosure** – Kemitraan has the following disclosure mechanism in place:

- Invitation to stakeholders at least 2 weeks or 10 working days before the event takes place.
- General information projects and activities are open to the public, at least, through its website. This information shall be delivered 2 weeks or 10 working days before their first face-to-face with stakeholders.
- General information at least outlines the project implementers, types of activities, goals and objectives of the activities, budget, stakeholder engagement plans, stages or general work plan.
- Public input information on planned activities or projects submitted through the website. This information is also accompanied by a change in the document is based on public input.

Disclosure is not required for a category C project. Per GCF's Information Disclosure Policy, advance disclosure on GCF and AE's websites are not required for Category C project.

**Grievance redressal** - At any time, an affected member of a community may raise their concerns or grievances related to the environmental and social impacts of the activities . The Grievance Redress Mechanism (GRM) of MCI is implemented through the Community Accountability Reporting Mechanism (CARM) that is designed to ensure accountability to affected populations while preventing exploitation and abuse. Through the CARM, MCI receives, assesses, handles, and resolves complaints or grievances from affected parties, both individuals and groups in a safe, confidential, transparent, and accessible channels. The accessible channels ensure MCI to respond quickly and effectively. It is embedded as a mandatory component of all MCI programs, with specific budgeting, staffing, and operational procedures in place to guarantee its functionality.

Every program/project under MCI, including BRAVE, is required to establish at least three feedback channels including face-to-face interaction, an anonymous channel, and one additional method appropriate to the local context, such as a hotline and email to CARM focal points and PMIU which will report to the MCI ethics team. The online channels include filling out the online grievance complaint form at [bit.ly/kritiksaran\\_mci](https://bit.ly/kritiksaran_mci) and emailing it to [kritiksaran@id.mercycorps.org](mailto:kritiksaran@id.mercycorps.org). For fast response, MCI will also provide a hotline: **+62 811-1000-381**. These channels are assessed to ensure there are no barriers for vulnerable and marginalized groups in speak up or submitting feedback and complaints. CARM fosters a close feedback loop where every non-anonymous complaint is resolved and obtained resolution. Information about CARM will be disseminated to project stakeholder in different instances, including workshops/trainings, public consultations/dialogues and others.

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## 5.6 Exit Strategy and Sustainability

The BRAVE project is a climate resilience initiative designed to ensure its positive impact continues long after the GCF support ends. Its five-pillar Exit Strategy focuses on making project outcomes self-sustaining, scalable, and replicable:

- **Strengthening Local Capacity and Ownership:** The project builds capacity at all levels. This includes from farmers and small businesses to government agencies. It translates climate data into actionable plans and integrates these plans into local and national development frameworks. Knowledge-sharing platforms will continue to operate after the project, fostering ongoing collaboration.
- **Securing Operations and Maintenance (O&M):** BRAVE invests in physical assets like climate information systems and infrastructure for livelihood interventions. The strategy ensures these are handed over to capable local institutions. MoUs will define O&M responsibilities and financing, and local government budgets will be advocated to include O&M line items to ensure long-term maintenance.
- **Financial Sustainability:** The project uses a market-driven approach to create sustainable livelihoods that aren't dependent on donors. It connects producers to markets and financial services, demonstrating profitable business models. The goal is to attract private investment and encourage companies to independently replicate these models in other areas.
- **Institutionalizing the Paradigm Shift:** BRAVE aims to shift mindsets from reactive disaster response to proactive, ecosystem-based risk management. It embeds climate resilience into government policies and planning at all levels, ensuring it becomes a standard part of development and resource allocation rather than a project-specific activity.
- **Post-Exit Monitoring:** A community-based monitoring system will track key indicators like productivity and avoided flood impacts after the project ends. This data will be used by local governments for adaptive planning, and academic institutions and NGOs will provide ongoing support for advocacy and knowledge sharing.

**Contribution to paradigm shift.** The BRAVE project creates systemic change by embedding climate resilience into planning, market systems, and governance structures. It ensures that communities transition from passive disaster victims to proactive managers of climate risk while local governments adopt and institutionalize climate-informed decision-making. The project will engage the private sector in order for them to understand resilience not as a cost but as a driver of competitiveness and supply chain security. This paradigm shift is expected to have an amplifying effect, with lessons and models replicated across other watersheds in Indonesia and potentially serving as a model for other Southeast Asian countries facing similar challenges.

Through its integrated approach, BRAVE ensures that the transition from GCF-supported implementation to nationally owned and community-driven continuation is smooth, financially viable, and technically robust. Its Exit Strategy guarantees that climate-resilient livelihoods, improved governance, and ecosystem restoration will not only be maintained but also scaled and replicated. By aligning with Indonesia's national priorities, mobilizing private sector investment, and embedding resilience into institutions and policies, BRAVE contributes to a lasting transformation toward climate-resilient, inclusive, and sustainable development pathways.



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## 6 Implementation arrangements

### 6.1 Stakeholder analysis

The project's approach to stakeholder management is guided by the following core principles:

- **Country ownership and leadership**- Ensuring that both the design and implementation are led by, and responsive to, the priorities of the participating countries and the evolving needs of the target beneficiaries.
- **Commitment to Gender Equality and Social Inclusion**- Adhering to the project's GESI standards and implementation plan.
- **Consistent stakeholder data** management-Establishing a standardized process and platform for recording, storing, and managing stakeholder details and data.
- **Knowledge sharing for impact** - Disseminating lessons learned and evidence generated by the project to promote scaling-up, replication, and long-term sustainability.

**The primary and secondary stakeholders for the project are outlined below.** This describes their interests and influence relevant to the project, their proposed role in the project, how they have been engaged in the design stage and the engagement strategy for implementation. This will be updated and refined throughout the delivery of the project.

**Table 13 Stakeholders list**

Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
NATIONAL				
BAPPENAS	Preparing long-term and mid-term development plans and protecting from climate change risks. It aligns development with international commitments (NDCs, SGD)	It has high power in coordinating all stakeholders to align with the plans and has a budgetary role in overall development issues including climate change.	Coordinate and align project with national plans and priorities	BAPPENAS will be closely managed and put in the advisory board of the project political steering. It leads annual planning and political decision making
Meteorology, Climatology, and Geophysics Agency (BMKG)	It is responsible to inform climate variability information to be used in sectorial policy, program and plans, capacity building for climate related stakeholders	Has strong power in climate related data at national level. It has regional offices and equipment to monitor and compile climate variable data.  Climate field school is also one of their flagship programs.	Provides access to climate variable data for the project areas, strengthens stakeholders on sectorial planning and design that incorporate climate information.  Collaborate with their Climatology Station and Maritime Station in Semarang to carry out climate field schools.	The project will engage BMKG through consultation, access data, and resource personnel for training and capacity building for local stakeholders, including collaborating in conducting a series of climate field schools in the upstream, midstream and downstream villages.
BBWS Pemali-Juana	BBWS is responsible in managing water resources of rivers to conserve and control destruction force of water	Conserve water resource management and control of the destructive power of water in the specific river in Petanglong Area	Provide advice and assist the project team on the long-term planning of Kupang watershed	BBWS will be closely consulted and engaged as project advisory board, from inception to the evaluation phases



Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
National Board for Disaster Management (BNPB)	It provides guidelines and direction, set standards, convey information, and report on disaster management activities	In the context of disaster management, BNPB supports tool, capacity building for provincial and local government, EWS technology application, etc	Provides advice, knowledge, and capacity building for local BPBD.	BNPB has a strong mandate on disaster management. BNPB will be engaged as part of the advisory board to provide inputs regarding flood contingency plan and response.
Ministry of Environment (including BPDAS)	It has an interest in preventing water quality. In the context of climate change, watershed conservation is strategic for meeting the NDCs target.	Has strong power in watershed management including conservation of land cover, pollution control and rehabilitation through policy and standard	Provide advice and technical knowledge in on watershed conservation and how the project contribute to NDCs	MoE has a strong mandate for climate change issues and NDCs. It will be closely consulted for watershed management, adaptation action registration for NDCs, and scale up and replication strategy.
Ministry of Women and Child Protection	formulate policies and coordinate the implementation of policies related to women's empowerment and child protection	The ministry setups national policy on gender, women empowerment, and child protection	Provides advise, knowledge, and guidance for gender and child protection integration strategy	The ministry will be consulted on the policy and strategy on gender equality and child protection strategy especially in relation to climate change impacts, and provide advice regarding GESI context incorporation in the project.
PROVINCIAL				
Bappeda Central Java	preparation of regional development plans, implementation of development planning, control, monitoring and evaluation of development implementation, as well as research and development.	Bappeda has a budgetary role in overall development issues including climate change. It can influence the budget allocation for specific agencies to intervene in Kupang and Sengkarang watershed	Since Kupang and Sengkarang are under the provincial authority, the project will closely manage Bappeda along the project cycle	It has a strong mandate in the climate change and has budgetary tools. The project will put Bappeda province in the advisory board to involve in strategic decisions and to guide relevant agencies in supporting the project or the topics.

Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
		management and flood control.		The project will engage them in the advisory board
Department of Public Works, Water Resources and Spatial Planning (DINAS PUSDATARU) Provinsi Jawa Tengah	It is responsible in implementing water conservation, utilization, and control of the destructive power of water in the rivers of Kupang and Sengkarang,	Enforcing the policy and standard on water management, conservations, utilization and control in the specific river in Petanglong Area	Provide advice and assist the project team on water management, conservations, utilization and control in the Kupang and Sengkarang watershed	As the authority who has the mandate for Kupang and Sengkarang watershed management, the project will engage them in the advisory board and technical team.
Environmental Agency of Central Java	It has an interest in preventing water quality and quantity. In the context of climate change watershed conservation is strategic for meeting the climate change action plan target.	Has strong power in watershed management including conservation of land cover, pollution control and rehabilitation through policy and standard	Provide advice and technical knowledge in on watershed conservation, and also explore the potential for collaboration in conservations	The agency will be consulted for conservation plans and measures under the project. .
Women and Children Protection Agency	The agency might get knowledge and support in protecting women and children from climate change impacts. However, the interest is low because the project activities are at municipal level.	It has a mandate to protect and improve participation of women and children. It has low influence on the project since the project at the municipal level.	It provides inputs and advises on optimizing women and children participation in the project. It can share the policy, norms, and standards.	The project will keep the agency informed about the project status and progress/ Sharing the lesson learnt and experience will allow potential scale up and replication.
Agriculture Agency	It is responsible for increasing agriculture production, food diversification and	It can support tools, expertise, and technical assistance to the farmers in adapting to climate change	It provides technical inputs, shares experiences, policies and programs on	The project will keep the agency informed about the project activities and results. The project will consult on CSA and GAP strategy and

Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
	resilience. The project might contribute to adapting to climate change in the agriculture sector and prevent/improve the production. The interest might be low since the project is at the site level.	in agriculture sectors. They will continue to measure and monitor climate information to implement CSA. Their participation influences the sustainability of the project output in livelihood.	adaptive agriculture systems.	share experience at the later stage for potential scale up and replication.
Marine and fishery agency	It is responsible for managing marine and fisheries resources, as well as supporting fisheries businesses and empowering coastal communities at the provincial authority. The interest might be medium to high since coastal and mangrove areas are also in their concern.	Supporting tools, expertise, and technical assistance to the fish farmers in adapting to flood impacts. Their participation influences the sustainability of the project output in livelihood.	It provides technical inputs, shares experiences, policies and programs on adaptive aquaculture systems.	The project will keep informed and to some extent manage closely in adaptive aquaculture. The project will consult on adaptive aquaculture strategy and share experience at the later stage for potential scale up and replication.
BPBD Central Java	It provides guidelines and direction, sets standards, conveys information, and reports on disaster management activities. Its interest might be medium to high because the Sengkarang and Kupang rivers are under provincial authority.	In the context of disaster management, BNPB supports tools, capacity building for provincial and local government, EWS technology application, etc. It has high power to influence local BPBD.	It provides advice, knowledge, and capacity building for local BPBD.	BNPB has a strong mandate on disaster management and long experiences in disaster management, EWS, etc. BNPB will be closely engaged throughout the project as it provides technical support and knowledge and advice for flood disaster management. The project will engage them in the advisory board.

Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
MUNICIPAL				
Bappeda/Bapperida	It is responsible for preparing planning and budget allocation for all agencies. It has interest to get resources to contribute in achieving the development goal and targets.	Bappeda has strong power to coordinate other institutions, allocate funds, and evaluate project direction to align with the development plan. This power can be positive or negative to the project.	Bappeda will provide advice and be involved in technical discussion especially in outcome 1 and 3. Their advice will ensure that the project contributes to the development plan and target.	The project will manage closely and suggest putting Bappeda representatives in both advisory board and technical team especially in outcome 1 and 3. The project will closely consult and coordinate to align the project direction with the development planning.
Public Works Agency	The agency is responsible for water management including drainage and water supply. It expects to gain knowledge, support, and assistance in managing stormwater and water resources.	It has authority, resources and knowledge in water management including water infrastructure planning & construction. It can affect the planning and implementation of the project particularly in the blue and green spaces output.	The Public Works Agency will provide technical inputs and advisory to all outputs related to water management planning, implementation, and scale-up. It informs relevant policies, norms, standards, and programs to the project to ensure alignment and synergy.	The project will manage closely and suggest putting the agency's representatives in the technical team. The project will consult and collaborate in activities on blue and green space, water management, and storm water issues.
Environmental Agency (DLH)	It has an interest in protecting water resources from pollution contamination and land cover. In the context of climate change, watershed conservation is a strategic climate change action plan.	It has authority in formulating policies, implementing, controlling, and evaluating flood impacts in terms of waste management and biodiversity protection. Its policies and program might	Environmental Agency (DLH) provides technical inputs and advisory in green open space issues. It will also monitor the potential impact of the project intervention and provide feedback to PMIU. It informs relevant policies,	The project will manage closely and suggest putting the DLH representatives in the technical team of outcome 1 and 2. The project will consult and collaborate in activities on blue and green space, and land coverage of watersheds.

Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
		affect green and blue space output.	norms, standards, and programs to the project to ensure alignment and synergy.	
Health Agency	Protecting public health from the impacts of flooding such as infectious diseases, clean water pollution, and damage to health facilities. It can gain knowledge and experience for climate associated diseases.	It is responsible for implementing a health emergency response system, educating the public about sanitation and environmental hygiene, and mobilizing health personnel and facilities for disaster response. Its authority and resources might influence the project activities in flood impacts and design of blue and green space.	The Health Agency provides inputs and advice on the potential health risks from the project activities. The agency will monitor the health impacts of the project and provide information to PMIU. Their inputs will be used by the PMIU to minimise the health impact by refining the activities or designs.	The project will manage closely and suggest putting the Health Agency representatives in the technical team of outcome 2. The project will consult on potential health risks from the project activities implementation.
Social Affair Agency	It has interest that the project contributes in improving DRR knowledge and strengthen community resilience especially the most vulnerable groups	Contributing in guidance in distributing logistics and ensuring living costs for flood affected communities. It might influence the project activities in disaster management and responses.	It provides technical inputs and advisory in management of disaster affected communities. It informs relevant policies, norms, standards, and programs to the project to ensure alignment, improvement, and synergy.	The project will manage closely and suggest to put the Social Affair Agency outcome 2 technical team. The project will consult regarding their input for the flood contingency plan.
Women and Children Protection Agency	The agency might get knowledge and support in protecting women and	It has a mandate to protect and improve participation of women and children. It might influence the project	It provides inputs and advises on optimizing women and children participation in the project.	The project will manage closely and suggest putting the Women and Children Protection Agency representatives in the technical

Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
	children from climate change impacts.	in improving the participation of women and vulnerable groups in all project activities.	It can share and advise engagement strategy, programs, and activity to ensure alignment and synergy.	team. The project will consult for GESI inclusion throughout project implementation. .
Agriculture Agency	It is responsible for increasing agriculture production, food diversification and resilience. The project might contribute to adapting to climate change in the agriculture sector and prevent/improve the production.	It can support tools, expertise, and technical assistance to the farmers in adapting to climate change in agriculture sectors. They will continue to measure and monitor climate information to implement CSA. Their participation influences the sustainability of the project output in livelihood.	It provides technical inputs, shares experiences, policies and programs on adaptive agriculture systems. It can share resources to jointly implement activities in using climate information in agriculture, CSA, and commodity processing.	The project will manage closely and suggest putting the Agriculture Agency representatives in the technical team, especially in outcome 2. It provides technical input in climate information, CSA, and agriculture commodity processing to PMIU throughout the project implementation. Their agriculture extension worker will also be closely engaged in the relevant training and demoplot implementation. Further, their engagement also opens up opportunities for project replication and scaling up.
Marine and fishery agency	managing marine and fisheries resources, as well as developing fisheries businesses and empowering coastal communities.	Supporting tools, expertise, and technical assistance to the fish farmers in adapting to flood impacts. Their participation influences the sustainability of the project output in livelihood.	It provides technical inputs, shares experiences, policies and programs on adaptive aquaculture systems. It can share resources to jointly implement activities in using climate information in aquaculture, adaptive	The project will manage closely and suggest putting Marine and fishery agency representatives in the technical team, especially in outcome 2. It provides technical input in aquaculture policy and practices to PMIU throughout the project implementation. Their aquaculture extension worker will also be closely engaged in the

Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
			livelihood, and commodity processing.	relevant training and demoplot implementation. Further, their engagement also opens up opportunities for project replication and scaling up.
BPBD	minimizing the impact of floods on communities. Its core mandate is disaster risk reduction, emergency response, and recovery planning. It has interest in protecting lives, assets, and ensuring community preparedness from hazards.	coordinating disaster management at the local level. It facilitates early warning systems, evacuation plans, contingency planning, inter-agency coordination, and community-based disaster risk reduction (CBDRR) initiatives. Their participation influences the sustainability of the project output in disaster resilience.	It provides technical inputs, advisories, and experiences to the project on disaster management. It can share policies, norms, standards, and programs. It can share resources, tools, and networks in disaster management within the project areas.	The project will manage closely and suggest putting BPBD representatives in the technical team, especially in outcome 1 and 2. It provides technical input to PMIU along the project implementation. The project will consult the BPBD and at the same time provide capacity building based on the learning of the project for potential scale up.
People with Disability Organizations	The organizations get knowledge, assistance and support/advocacy for meaningful participation and to adapt to climate change impacts	It might have low power to influence the project. However, their participation represents the principle of no one left behind which has been the global and national commitments.	People with Disability Organizations are important beneficiaries to involve in the project design and implementation. The project will target them in capacity building and provision of support.	Has strong interest in the project as beneficiaries. The project will keep them informed about the project activities and progress. The project will establish direct and indirect communication channels, targeting them for capacity development.
Farmers and farmer groups	The association get knowledge, assistance, and	They are project direct beneficiaries for adaptive livelihood. Their active participation, local	Farmers and farmer groups are important beneficiaries to involve in the project design and implementation.	Has strong interest in the project as beneficiaries. The project will keep the farmers and their groups informed about the project activities



Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
	support to adapt to climate impact and risk.	knowledge, and assets determine the successful project implementation in all livelihood related activities.	The project will target them in capacity building and provision of support.	and progress. The project will establish direct and indirect communication channels, targeting them for capacity development.
Agriculture and aquaculture processors offtakers	The companies get better and more suppliers of agriculture and aquaculture commodities.	They are important stakeholders in the commodity value chain that might influence the project activities related to adaptive livelihood. Their business interest and commodity information might be used to establish continued markets.	The project needs to monitor their interest so that the project results align with their interest including the trend market and commodity requirements. The project might facilitate partnership between producers and processors.	The project will monitor their interest to understand market trends, commodity requirements and specification, and prices. The project will facilitate partnership/agreement between producers and processing actors to ensure supply and demand.
Women headed families and its association	The group get access to capacity development and assistance for livelihood and DRR from the project	They are an important targeted group and beneficiaries that are vulnerable to climate change impacts.	To keep the association informed about the project activity and progress. The association can ensure female-headed households participate in the project.	The project will keep the association informed about the project activities and results, inviting in the kick-off, circulate progress update, workshop, seminar, etc. As for the family head, they can be involved in the project as part of women groups that run value-added scheme processes.
Agriculture related company (Sang Hyang Seri, BISI, Corteva, Syngenta, etc)	The companies (seed producers) gain access to new markets or through the implementation of the project.	Their business interest might affect to the project activities, output, and indicators i.e. level of participation and adoption of measures that will be promoted by the project	They can be potential partners to promote sustainable agriculture practices, business to business cooperation with the project beneficiaries,	As part of the activities under outcome 3, potential partner companies will be identified. These companies will be integrated into the closed-loop agriculture model, connecting them with other agricultural and market actors



Stakeholder	Interests in the project	Influence to the project	Proposed role in the project	Engagement strategy for implementation
		including selection of seeds and production techniques		involved in selected commodities. The project will also explore potential collaboration through B2B mechanism
Aquaculture related companies (Central Proteina Prima, JSI, etc)	The companies (fish feed, fisheries products, and/or fish processing industries) gain access to larger markets or suppliers through the implementation of the project.	Their business interest might affect the project activities, output, and indicators i.e. level of participation and adoption of measures that will be promoted by the project.	They can be potential partners to promote sustainable aquaculture practices, business to business cooperation with the project beneficiaries,	As part of the activities under outcome 3, potential partner companies will be identified. These companies will be integrated into the closed-loop agriculture model, connecting them with other agricultural and market actors involved in selected commodities. The project will also explore potential collaboration through B2B mechanism

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## 6.2 Implementation and governance

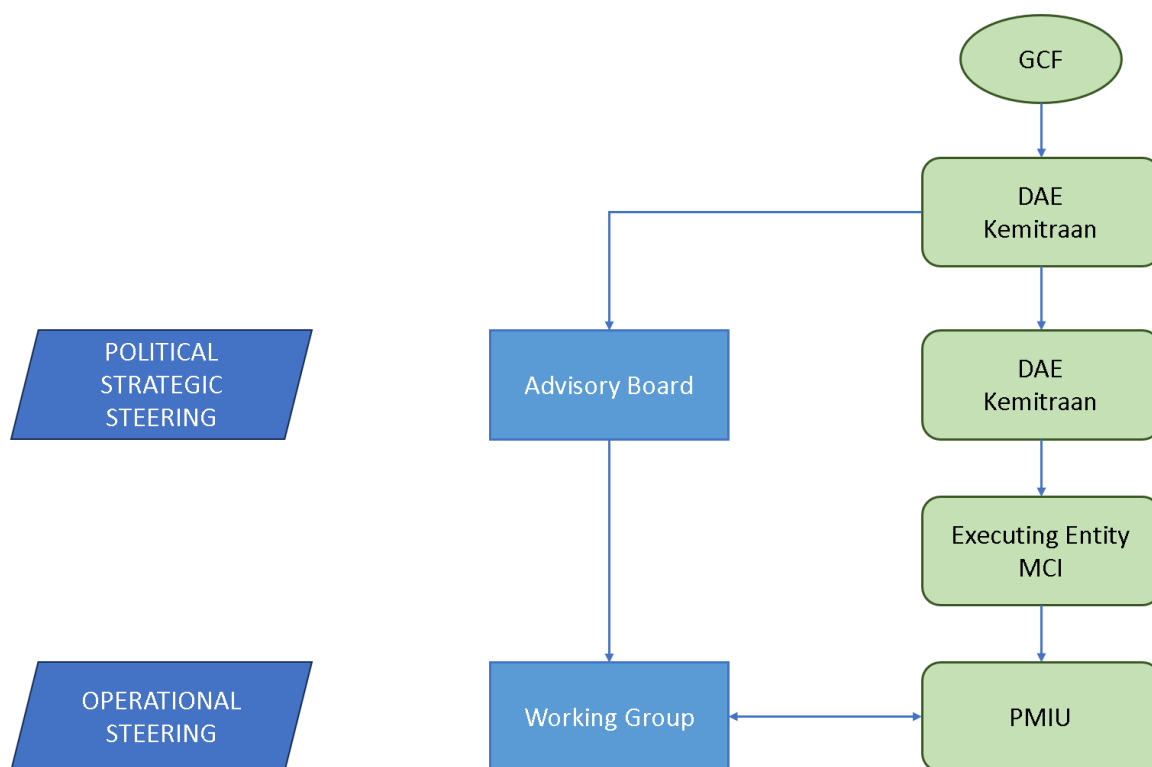
**This section provides the detailed set of implementation arrangements for the project, covering the project delivery structure in terms of institutions and individuals, financial flow arrangements and a robust governance system.**

### 6.2.1 Project delivery structure

The BRAVE Program covers the area of Sengkarang and Kupang river basins, crossing the administrative areas of Pekalongan and Batang Regencies as well as Pekalongan City. Under the regulatory perspective, the program intervenes two issues: water resources management and watershed management. The governance of water resources in Indonesia is regulated under Government Regulation (PP) No. 38/2011 on Rivers. The management of rivers that cross district and city boundaries within a single province—such as the Kupang and Sengkarang rivers—falls under the technical mandate of the Agency of Public Works, Water Resources Management, and Spatial Planning of Central Java Province (Dinas PUSDATARU) of Central Java. This management adheres to norms, standards, and technical guidelines issued by the Ministry of Public Works (PU) through the Directorate General of Water Resources. On strategic issues, the central government may provide additional support to the provincial government.

The second issue, watershed management covers a broader ecological scope, representing an integrated ecosystem unit delineated by natural topographical boundaries. The management of watersheds is regulated under Government Regulation (PP) No. 37/2012 on Watershed Management. At the national level, responsibility lies with the Ministry of Forestry through the Directorate General of Watershed Management and Forest Rehabilitation (PDASRH). At the provincial level, Dinas PUSDATARU develops watershed management plans and implement rehabilitation and conservation programs. Meanwhile, district and municipal governments integrate watershed management into their spatial planning documents (RTRW). Depending on the specific issue, multiple municipal agencies may be involved—for example, the Environmental Agency (DLH) for open green spaces and conservation measures, the Public Works Agency for drainage system, and the Agriculture Agency for farmland management.

Reflecting on the regulatory multi-government framework above, the stakeholder architecture consists of three levels of steering: the political level, the strategic level, and the operational level. The design and implementation of the BRAVE Program need to be structured to accommodate and align with this distribution of authority. To make a more effective and efficient decision making while ensuring meaningful participation of all stakeholders including community at operational level, the steering structure will be developed in two levels combining political and strategic steering stakeholders and operational level. The steering structure will assist and guide PMIU by making strategic decisions. Overall steering structures is visualised in the following diagram:



**Figure 20 Steering committee structure**

### **Advisory Board (Political & Strategic Steering)**

The Advisory Board plays a political and strategic steering level that serves as the decision-making and guidance body. The advisory board also makes strategic decisions to ensure the project is implemented on time, effectively, and efficiently.

It provides overall project direction from planning to evaluation annually ensuring national development priorities. Its primary role is to determine the path to achieve objectives by:

- Leading the annual planning and targets of the program.
- Aligning the project output and outcome with national priorities
- Evaluating project learning for shifting paradigm
- Reviewing available strategic options and deciding the priority.
- Analysing deviations from agreed targets.
- Adjusting implementation strategy and milestones for future implementation to ensure overall goal achievement

The Advisory Board consists of high-ranking officials—such as directors general of ministries, chief of provincial agencies, and regent/mayor or executive secretaries of three municipalities. The board is responsible for carrying out the above tasks and providing big-picture guidance and oversight to keep the project aligned with its overall objectives. To ensure these tasks, the board meets twice a year for planning and evaluation events.

### **Working Groups (Operational Steering)**

The working groups translate strategic goals and targets into technical activities in accordance with the project intervention. The technical team provides inputs, advice, and feedback to PMIU in executing the project activities. The technical team, comprising representatives of organizations and agencies that both influence and are affected by the project, plays a pivotal role in bridging communication between the PMIU and their respective institutions. They align and establish synergy between their organization and the project resources. The joint mobilization of project resources and stakeholder capacities

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enhances efficiency and strengthens collaborative efforts, thereby contributing to the effective achievement of the project's objectives. The functions of technical teams include:

- Translating strategies and targets into operational guidance and priorities for PMIU
- Identifying potentials overlapping and synergies of activities and resources between the project and local governments
- Providing inputs and technical advice for the PMIU for effective project implementation and execution.
- Monitoring the project activities and results to provide reports to the advisory board for strategic decisions.

### **Project Implementation and Management Unit**

The PMIU is responsible for the practical, day-to-day management of project implementation. Its main functions include:

- Making all operational decisions required to carry out specific measures within the framework set by the strategic level.
- Providing the strategic steering level with reliable information on progress, challenges, and discrepancies in implementation, thus serving as a critical feedback loop.
- Developing detailed action plans and ensuring their execution.
- Engaging a broader range of actors, including updating stakeholder maps and engagement plans in the planning and delivery of project measures.
- Providing inputs based on the project experiences and learning to the working group as part of advocacy measures for the government policy, program, and plan improvement.

In terms of information flow, PMIU is the primary source of data, findings, experiences, and lessons learned. PMIU shares these data with working groups for policy advocacy. Working groups analyze and adopt recommendations for policy improvement, replication, and/or scale-up. Furthermore, experiences and lessons learned are passed on to the advisory board.

## **6.3 Institutional and project level grievance redress mechanisms**

The project will build on Kemitraan's Grievance Redress Mechanism (called its 'Complaint Handling Policy') and MCI's Grievance Redress Mechanism (CARM).

### **Kemitraan's Grievance Redress Mechanism**

**The Complaint Handling Policy includes an established complaints procedure for any project involving Kemitraan but ensure this is also accessible to community members.**

**Kemitraan is committed to:**

- **Transparency:** Ensuring that our complaint handling process is clear and accessible to all stakeholders.
- **Fairness:** Treating all complaints impartially and with respect.
- **Responsiveness:** Addressing complaints promptly and effectively.
- **Continuous Improvement:** Using feedback from complaints to enhance our services and operations.

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**In doing so, Kemitraan upholds the following legal provisions:**

- 1. Law No. 30/1999 on Arbitration and Alternative Dispute Resolution:** Outlines procedures for resolving disputes through arbitration and alternative dispute resolution mechanisms
- 2. ISO 9001:2015 on Quality Management Systems:** Requires obtaining feedback for organization, including complaints. Furthermore, it requires organization to investigate and plan corrective actions to enhance continual improvement within organization.

**Kemitraan has the following mechanisms in place with respect to grievance addressal:**

- **Multiple channels for complaints:** You can submit a complaint via phone, WhatsApp, email, or a physical letter.
- **A dedicated Complaints Officer:** This person is responsible for handling all complaints and communicating with the relevant staff or partners to find a solution.
- **An escalation process:** If you are not satisfied with the response, you can escalate the complaint to senior management or the Executive Director.
- **A policy for anonymous complaints:** Anonymous complaints will be investigated as long as they are accompanied by sufficient information and evidence.

Kemitraan's programme and operational policies are outlined on its website <https://www.kemitraan.or.id/en/about-us/program-and-operational-policies/> which includes details on all the procedures and policies related to accountability. This invites those with concerns or grievances from an affected community, about the environmental and social plans or performance of any project. There is an online grievance complaint form or the email address [pengaduan@kemitraan.or.id](mailto:pengaduan@kemitraan.or.id).

## **MCI's Grievance Redress Mechanism**

The Grievance Redress Mechanism (GRM) of MCI is implemented through the Community Accountability Reporting Mechanism (CARM) that is designed to ensure accountability to affected populations while preventing exploitation and abuse. Through the CARM, MCI receives, assesses, handles, and resolves complaints or grievances from affected parties, both individuals and groups in a safe, confidential, transparent, and accessible channels. The accessible channels ensure MCI to respond quickly and effectively. It is embedded as a mandatory component of all MCI programs, with specific budgeting, staffing, and operational procedures in place to guarantee its functionality.

MCI appoints CARM focal points at both the country and program levels who are responsible for managing the feedback and inputs including to record, clarify, verify, and follow up. MCI informs all targeted community members as well as partners to make them aware and sensitive to the cases, reporting mechanism, and channels. Every program is required to establish at least three feedback channels including face-to-face interaction, an anonymous channel, and one additional method appropriate to the local context, such as a hotline, email, or social media platform. These channels are assessed to ensure there are

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no barriers for vulnerable and marginalized groups in speak up or submitting feedback and complaints.

CARM is applicable to provide all types of safeguard policies and standards of MCI. It includes anti-fraud, anti-corruption, anti-trafficking, child safeguard, code of ethics, anti-discrimination, protecting from harassment and bullying, prohibited transaction, conflict of interest, and speak out policy. Therefore, these policies must be informed to the targeted partners as well as communities in every program, especially vulnerable and marginalised groups.

### **Project-level Grievance Redress Mechanism**

The project will build GRM according to the existing policy of CARM. Since it is a mandatory procedure of all MCI programs, the project will allocate a specific budget, assign specific staff as focal points, and develop operational procedures to ensure functionality. The procedures are aligned and integrated with the current CARM reporting system and database to make it easy to monitor and respond to the national as well as global level. The project MEL officer will serve as the **CARM-Safeguarding focal point** for the BRAVE project. He/she will ensure the availability of relevant forms and communication channels, and access to safeguard policies and standards. Special attention will be given to vulnerable and marginalized groups so that they can express their concerns without barriers.

The **MEL officer and CARM-Safeguarding focal point** will actively inform and increase sensitivity of all targeted community members and partners about the GRM. The focal point will:

Inform safeguard policies and standards to improve awareness and sensitivity of all targeted communities, partners and subrecipients. Provide reference of CARM on <https://www.mercycorps.or.id/accountability>,

Provide three feedback channels through face-to-face, hotline and email to focal points and PMIU which will report to the MCI ethic team. The online channels include filling out the online grievance complaint form at [bit.ly/kritiksaran\\_mci](https://bit.ly/kritiksaran_mci) and emailing it to [kritiksaran@id.mercycorps.org](mailto:kritiksaran@id.mercycorps.org). For fast response, MCI will also provide a hotline: **+62 811-1000-381**. These feedback channels should be brought up during training, workshops and meetings.

Record and input the incidents and complaint in the monitoring sheet and database to make sure appropriate and quick response

Inform the complaint anonymously to demonstrate the effectiveness of the GRM and build trust to wider targeted communities

Evaluate and assess the effectiveness of project GRM and refine and improve the mechanism

The roles and responsibilities for managing GRM are shared between the focal point, PMIU, MCI, Kemitraan, and NDA. Role and responsibilities of each actor:

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- CARM-Safeguarding Focal point: responsible to inform and do community sensitization activities regarding safeguard policies and standards at the program activity level. He/she receives complaints from all channels and log in the form and database.
  - PMIU Lead (Project Manager/PM): monitor and review the feedback. He/she might require detailed information on the event chronology, severity, and other critical information. As per suggestion from the MCI ethics team and when it is required (depending on the grade of the feedback), He/she then will undertake necessary follow up, as a response to the feedback.
  - MCI: it is the responsibility of the ethics team to assess and give feedback and advice to MCI executive team, PMIU lead and focal points (depending on the grade of the feedback).
  - Kemitraan: monitor and provide advisory on the feedback mechanism referring to GCF policies, guidelines and standards. Take serious follow up on complaint grade 5-6
  - NDA: monitor and provide advisory on feedback mechanisms referring to GCF policies, guidelines and standards. Take serious follow up on complaint grade 5-6

The focal points will receive and register the complaint through form and input into the database. Feedback received is addressed according to its severity grade: Grades 1–3 are resolved at the program level with the involvement of the Program Manager; Grade 4 requires action from the CARM Team; Grade 5 is escalated to the Executive Director; and Grade 6 is handled directly by the Ethics Team. Each case is managed in line with internal procedures and the urgency of the issue. The duration of feedback resolution under the CARM mechanism is determined by the assigned severity grade. Higher-grade cases typically require more time to process due to their complexity and the need for thorough investigation and cross-functional coordination. The duration for resolving feedback through the CARM mechanism varies by severity grade, ranging from as few as 3 working days for minor cases to 45 working days or more for complex ethical violations, with higher-grade cases generally requiring longer processing due to their complexity and the need for thorough investigation. Duration should be sufficient to screen the complaint, outline how the grievance will be processed, screen for eligibility as well as assign organizational responsibility for proposing a response. This process will possibly involve engaging with other project stakeholders to resolve the issue.

Mercy Corps acknowledges the complainant's right to pursue external avenues if unsatisfied with the internal resolution process. While the GRM may respond to inquiries, it does not serve as a legal advisor. All grievances are documented and securely stored, typically in accordance with donor requirements and organizational data retention policies.